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MALACCA STRAIT PILOT

COMPRISING
MALACCA STRAIT AND ITS NORTHERN
APPROACHES, SINGAPORE STRAIT,
AND THE WEST COAST
OF SUMATRA

THIRD EDITION
1946

CAUTION WHEN APPROACHING BRITISH PORTS.

Caution.—Mariners should always consult Admiralty Notice to Mariners No. 1 of the current year for the latest information on the subjects mentioned below.

PART I.—CLOSING OF PORTS.

(1) My Lords Commissioners of the Admiralty having taken into consideration the fact that it may be necessary to forbid all entrance to certain ports of the Empire, this is to give Notice that on approaching the shores of the British Isles, or any of the ports or localities of the British Empire, a sharp lookout should be kept for the signals described in the following paragraph, and for the vessels mentioned in paragraph (5), Part II, of this Caution, and the distinguishing and other signals made by them. In the event of such signals being displayed, the port or locality should be approached with great caution, as it may be apprehended that obstructions may exist.

(2) If entrance to a port is prohibited, three *red* lights vertically disposed by night, or three *red* balls vertically disposed by day, will be exhibited in some conspicuous position in or near to its approach, which signals will also be shown by the vessels indicated in paragraph (5), Part II, of this Caution.

If these signals are displayed, vessels must approach the port with the greatest caution, and implicitly obey all orders or signals given them by the Examination vessel or Signal station.

(3) At some ports or localities at home or abroad, searchlights are occasionally exhibited for exercise. Instructions have been given to avoid directing moveable searchlights during practice on to vessels under way, but mariners are warned that great care should be taken to keep a sharp lookout for the signals indicated in paragraph (2) above, when searchlights are observed to be working.

PART II.—EXAMINATION SERVICE.

(4) In certain circumstances, it is also necessary to take special measures to examine vessels desiring to enter the ports or localities at home or abroad.

(5) In such case, vessels carrying the distinguishing flags or lights mentioned in paragraph (7) will be charged with the duty of examining ships which desire to enter the port and of allotting positions in which they shall anchor. If Government vessels, or vessels belonging to the local port authority, are found patrolling in the offing, merchant vessels are advised to communicate with such vessels with a view to obtaining information as to the course on which they should approach the port. Such communication will not be necessary in cases where the pilot on board has already received this information from the local authorities.

(6) As the institution of the Examination Service will probably be unknown to vessels desiring to enter the port, especial care should be taken in approaching the ports, by day or night, to keep a sharp lookout for any vessel carrying the flags or lights mentioned in paragraph (7), and to be ready to "bring to" at once when hailed by her or warned by the firing of a gun or sound rocket.

In approaching by night any port in the British Empire, serious delay and risk will be avoided if four efficient all round lanterns, two *red* and two *white*, are kept available for use.

(7) By day the distinguishing flag of the Examination vessel will be a special flag (white and red horizontal surrounded by a blue border).

Also, three *red* balls vertically disposed if entrance is prohibited.

Usually the Examination vessel will fly the blue ensign, but in certain circumstances she may fly the white ensign.

By night the steamer will carry: (*a*) Three *red* lights vertically disposed if entrance is prohibited; (*b*) three *white* lights vertically disposed if entrance is permitted.

The above lights will be carried in addition to the ordinary navigation lights, and will show an unbroken light around the horizon.

(8) Merchant vessels approaching a British port, at which the Examination Service is in force, must hoist their signal letters on arriving within visual signalling distance of the port and are not to wait for the signal "What is the name of your vessel?" to be made from the Examination vessel.

(9) Masters are warned that, before attempting to enter any port when the Examination Service is in force, they must in their own interests strictly obey all instructions given to them by the Examination vessel.

Whilst at anchor in the Examination Anchorage, Masters are warned that it is forbidden, except for the purpose of avoiding accident, to do any of the following things, without permission from the Examination Officer:—(*a*) To lower any boat; (*b*) to communicate with the shore or other ships; (*c*) to move the ship; (*d*) to work cables; (*e*) to allow any person or thing to leave the ship.

(10) In case of fog, Masters of vessels are enjoined to use the utmost care, and the port should be approached with caution.

(11) When the Examination Service is in force, merchant vessels when approaching ports are especially cautioned against making use of private signals of any description, either by day or night; the use of them will render a vessel liable to be fired on.

(12) The pilots attached to the ports will be acquainted with the regulations to be followed.

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NOTATIONS OF SUPPLEMENTS AND ANNUAL SUMMARIES OF NOTICES TO MARINERS RELATING TO THIS BOOK.

To be filled in by Navigating Officer.

(In Chart Depôts the first two columns are alone to be filled up.)

Title.	Date of Publication and Number.	Whether pasted in or noted in Margins of Book, and Date of each Correction.

CAUTION.

Attention is called to British Admiralty Notices to Mariners Nos. 1, 4 and 7, which are published annually.

NOTICE.

This volume should not be used without reference to the latest Supplement and Annual Summary of Notices to Mariners affecting it which may have been published.

A Supplement to this volume will generally be published annually until the latter is again taken up for revision.

After the publication of Supplement No. 1, each succeeding supplement cancels the former.

Between the time of the volume being taken up for revision and the publication of the new edition no supplement will be issued, but early in each year a Summary of the Admiralty Notices to Mariners affecting the volume, which have been published during the preceding year, will be issued as a separate publication.

The publication of all Supplements and Summaries of Notices to Mariners is announced in Admiralty Notices to Mariners.

The latest Supplement and any Annual Summary of Notices to Mariners that has been published affecting this volume will be obtainable gratuitously by purchasers of this volume from the Agents for the sale of Admiralty charts and other Hydrographic publications, on application either personally or by letter; in the latter case the cost of postage must be enclosed. For a list of these Agents *see* Admiralty Notice to Mariners No. 2, published annually.

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MALACCA STRAIT AND ITS NORTHERN
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THIRD EDITION, 1946

ALL BEARINGS ARE TRUE

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1946

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To face page ii.]

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CAUTION.

IN THIS WORK THE BEARINGS ARE ALL TRUE, AND WHEN GIVEN IN DEGREES ARE RECKONED CLOCKWISE, FROM 000° (NORTH) TO 359°.

THE BEARINGS OF LIGHTS ARE GIVEN FROM SEAWARD.

THE LATITUDES AND LONGITUDES GIVEN IN THE TEXT ARE APPROXIMATE.

THE DISTANCES ARE EXPRESSED IN NAUTICAL MILES OF 60 TO A DEGREE OF LATITUDE.

A CABLE'S LENGTH IS ASSUMED TO BE EQUAL TO THE TENTH PART OF A NAUTICAL MILE.

THE DEPTHS ARE GIVEN BELOW CHART DATUM LEVEL WHERE NOT OTHERWISE STATED.

HEIGHTS ON THE LAND ARE GIVEN ABOVE MEAN LEVEL OF HIGH WATER SPRING TIDES.

FIGURES IN BRACKETS GIVEN AFTER THOSE DENOTING FEET, FATHOMS AND YARDS ARE THEIR EQUIVALENTS IN METRES.

TIME IS EXPRESSED IN THE FOUR-FIGURE NOTATION COMMENCING AT MIDNIGHT.

THE TERM "STEAM VESSEL" USED HEREIN INCLUDES ANY VESSEL PROPELLED BY MACHINERY.

A NAME IN BRACKETS, IMMEDIATELY FOLLOWING ANOTHER NAME, IS THE OBSOLETE NAME WHICH IS STILL SHOWN ON THE ADMIRALTY CHARTS. AS A GENERAL RULE, THE BRACKETED NAME IS ONLY INSERTED IN THE DESCRIPTION OF THE PLACE OR OBJECT PREVIOUSLY BEARING THAT NAME.

WHEN SHADING IS USED TO INDICATE COLOURS OF FLAGS, TIDAL LIGHT SIGNALS, OR BEACONS, IT IS AS FOLLOWS:

░	▥	▤	▧	■
Yellow.	Red.	Blue.	Green.	**Black.**

ADVERTISEMENT TO THIRD EDITION

The Malacca Strait Pilot contains a description of the northern approach to Malacca strait, and through that strait to Singapore strait and the entrance to the China sea, and includes the northern and western coasts of Sumatra.

This, the third edition, has been prepared by Captain F. M. Hodgson, R.N., and in it is embodied the latest information received from the Colonial authorities and the Netherlands East Indies Government.

The meteorological information has been revised by the Meteorological Office of the Air Ministry. Temperature is expressed in degrees Fahrenheit, rainfall in inches, speed in knots, and distance in nautical miles, unless expressly stated otherwise. Information received from meteorological services which do not use these units has been converted into the units mentioned above by the Meteorological Office.

Mariners and others are invited to forward to the Hydrographer of the Navy, Admiralty, London, S.W.1, any information that may come under their notice, which would be useful for the correction of the charts and other hydrographic publications issued by the British Admiralty ; *early* advice as to newly-discovered dangers, the establishment of, or changes in, any aids to navigation, is especially requested.

Copies of a form (H. 102) on which to render information can be obtained gratis from the Hydrographer of the Navy, Hydrographic Supplies Establishment, Creechbarrow House, Taunton, Somerset, or from any of the Admiralty Chart Agents in Great Britain and abroad, a list of whom is published, annually, in Admiralty Notice to Mariners No. 2.

By the publication of this volume, the second edition of Malacca Strait Pilot, 1934, and Supplement, No. 8, 1945, are cancelled, and all information affecting that work contained in Notices to Mariners up to and including No. 3823 of 1946, has been embodied in this volume ; for Temporary and Preliminary Notices to Mariners affecting this edition, the list of Temporary and Preliminary Notices to Mariners in force, published monthly in the weekly edition of the Admiralty Notices to Mariners, should be consulted.

A. G. N. WYATT,
Rear-Admiral and
Hydrographer of the Navy.

Hydrographic Department,
Admiralty, London,
20th November, 1946.

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OF WORDS OCCASIONALLY FOUND ON THE CHARTS AND IN THE SAILINGS DIRECTIONS.

MALAY.

Malay.	English.
Ayer	Water.
——masin	Salt water.
Baharu	New.
Barat	West.
Batu	Rock, stone.
Besar	Large, great.
Beting	Shoal, sand.
Bukit	Hill.
Chetek	Shallow.
Dalam	Deep.
Darat	Coast, land.
Gunong	Mountain.
Gusong	Reef of rocks.
Hitam or Itam	Black.
Jambatan	Mole, jetty.
Kelapa	Coconut.
Kaler	North.
Kali	River.
Kampong	Village.
Karang	Coral.
Kayu	Tree.
Kechil	Little, small.
Kering or kring	Dry.
Kidul	South.
Kuala	Mouth of a river.
Labuan	Anchorage.
Lama	Old.
Laut	Sea.
Lumpur	Mud.
Muara	Mouth of a river.
Negri	Town, State.
Nipah	Small marsh palm.
Panjang	Long.
Pantai	Coast, seaboard.
Pasir	Sand.
Pisang	Banana.
Prau	Boat, ship.
Pulau	Island.
Puteh	White.
Renda	Low.
Rotan	Rattan cane.
Rumah	House.
Selat	Channel, strait.
Sungei	River.
Tanah	Land, country.
Tanjong	Cape, point.
Telok	Bay.
Tepi laut	Coast, seaboard.
Terumbu	Dangerous hidden shoal.
Tohor	Shallow.
Trusan	Channel.
Tua or tuah	Old.

PRINCIPAL POINTS OF THE COMPASS (MALAY).

Malay.	English.	Malay.	English.
Utara	North.	Salatan	South.
Utara-samata-timor	N.N.E.	Salatan-daya	S.S.W.
Timur-laut	N.E.	Barat-daya	S.W.
Timur-samata-utara	E.N.E.	Barata-samata-salatan	W.S.W.
Timur	East.	Barat-tapat	West.
Timur-tanggara	E.S.E.	Barat-samata-atara	W.N.W.
Tanggara	S.E.	Barat-laut	N.W.
Salatan-tanggara	S.S.E.	Utara-barat-laut	N.N.W.

SIAMESE.

Siamese.	English.	Siamese.	English.
Ao, Au	Bay, creek.	Lem	Cape, point.
Ban	House, or, if with place-name, village.	Lom	Wind.
		Luang	Large.
		Lueng	Yellow.
Bo	Lake.		
Bung	Swamp.	Mae	River.
		Mai	New.
Chiang	Town.	Menam	River.
Chong	Strait.	Monthon	Province or State.
Chong-Kab	Narrow.	Muang	Town.
Dam	Black.	Nai-kwa	Inner.
Deng	Red.	Nakawn, nakhon	Town.
Dinio	Clay.	Noi	Little.
Din-saw-pong	Chalk.	Nok-kwa	Outer.
Don	High land.		
Doy	Hill.	Pa Dong	Forest.
		Pak	Mouth.
Fai	Fire, light.	Pak-nam	Mouth of a river.
Fang	Shore.	Phra-chedi	Pagoda.
		Pom	Fort.
Gao	Old.	Pu-khaw	Mountain.
Goh	Island.		
		Sai	Sand, gravel.
Hard	Beach.	So-cloke	Rock.
Hardzai	Sand beach.		
Hin	Rock.	Ta-le	Sea.
Hlaem, hlem	Cape, headland	Ta-le-sab	Lake.
Ho	Tower.	Tai	Siamese.
Hoioy	Stream.	Tam	Low.
Hyai	Great.	Tit nua	North.
		Tit tai	South.
Kao	Old.	Tit tawan-ok	East.
Khão	White.	Tit tawan tok	West.
Khlong, Klong	Canal or creek.	Ti-thort-samor	Anchorage.
Khok	Hill.	Tong Koong	River bend.
Klone	Mud.		
Ko, Koh	Island.	Wat	Temple.
Lang	Lower.	Yai	Great.
Lek	Small.	Yai-kwa	Greater.
		Yord	Top.

SUMATRAN DIALECTS.

The areas within which these words are used are inserted in brackets, but it must be remembered that, excepting in the islands on the west coast, there is considerable overlapping.

Native.	English.	Native.	English.
Air (Benkoelen)	Stream.	Lho (Achin)	Bay.
Aroïh (Achin)	Strait.	Loina (Mentawei Is.)	Tree.
		Lugu (Simeuloe)	Inlet.
Bagan (Achin)	Fishing village.		
Batang (W. Sumatra)	River.	Mabuak (Mentawei Is.)	River.
Batee (Achin)	Rock, stone.	Merah (Achin)	Red.
Bayang (W. Sumatra)	Shadow. Applied to a reef when bottom is visible.	Monga (Mentawei Is.)	River.
		Nusa (Mentawei Is.)	Island.
		Pasar (Benkoelen)	Village.
Benting (Achin)	Fort.	Ponchak (Achin)	Peak.
Gebua (Benkoelen)	Shoal.	Sabeo (Mentawei Is.)	Large.
Gedang (Achin)	Great.	Sigosok (Mentawei Is.)	Small.
Gide (Nias)	River.		
Gle (Achin)	Mountain.	Tasik (Achin)	Lake.
Goso (Nias)	Reef.	Tekong (Achin)	Reef.
Gosong (W. Sumatra)	Reef.		
Guguk (Mentawei Is.)	Bay.	Ujong (Achin)	Cape, point.
		Ulu (Benkoelen)	Mountain.
Krueng (Achin)	River.		
		Wai (Benkoelen)	River.
Leleo (Mentawei Is.)	Mountain.		

DUTCH.

Dutch.	English.	Dutch.	English.
Archipel	Archipelago.	Meer	Lake.
Baai, bocht	Bay.	Nieuw	New.
Buiten	Outer.	Noord	North.
Eiland, mios	Island.	Oost	East.
Eilandje	Islet.	Oud	Old.
Gebergte	Range of mountains.	Reede	Roadstead.
		Rif	Reef.
Golf	Gulf.	Rivier	River.
Groot, groote	Great.		
		Straat	Strait.
Hoek, kaap	Cape, point.		
		Vlakte	Plain.
Klein, kleine	Little.	Vulkaan	Volcano.
Kreek	Creek.		
		West	West.
Loegoe	Inlet.		
		Zuid	South.

SYSTEM OF ORTHOGRAPHY.

The following rules for the spelling of geographical names (termed the R.G.S. II system) have been adopted for British official use, and the names in Admiralty Hydrographic publications will be rendered in accordance with these rules as opportunity occurs.

In new editions of the various volumes of sailing directions names are, generally speaking, given in accordance with these rules, but where the name on the chart shows an older rendering of a name, such chart name is given in brackets after the new rendering and will also be given in the Index.

The rules for spelling in the R.G.S. II system are as follows:—

(1) The spelling of every place-name in an independent country or self-governing dominion using the Roman alphabet (including " Roman " alphabets containing extra or modified letters, such as Czech, Serb-Croat, Polish, Romanian, etc.) shall be that adopted by the country or dominion.

(2) In colonial possessions the spelling of such place-names as belong to languages coming under Rule (1) will be spelt in accordance with that rule.

(3) The accents and diacritical marks in official use by the above countries will be retained. Wherever it appears desirable, the pronunciation will be shown by giving the name as transliterated on the system below.

(4) All other place-names throughout the world will be spelled in general accordance with the following system.

The broad features of this system are—

(*a*) That vowels are pronounced as in Italian and consonants as in English:

(*b*) That every letter is pronounced, and no redundant letters are used.

This system aims at giving a close approximation to the *local* pronunciation; but it is recognised that in some languages, notably Russian, Greek, and Arabic, the necessity for letter-for-letter transliteration often renders this impossible.

TABLE OF SPELLING AND PRONUNCIATION R.G.S. II.

a	The long and short Italian vowels, as in *lāvă*	Somāli ; Răvennă.*
ä	Between *a* in *fat* and *e* in *eh* ? ; chiefly in Teutonic and Finno-Ugrian languages	Mähring ; Pärnu.
ai	The two Italian vowels, frequently diphthongal, almost as in *aisle* ; but pronounced *ei* and *ĕ* in Greek names	Wadai ; Shanghai.
au	The two Italian vowels ; frequently diphthongal ; almost as *ou* in *out*	Sakau ; Bauchi.
aw	When followed by a consonant, or when terminal, as in *awl, law*	Dawna ; Saginaw.
b	As in English.	
c	Not to be used, but always replaced by *k* or *s* ; except in the compound *ch*, and in many conventionally-spelt words, as	Kandahar ; Serang. Calcutta ; Celébes.
ch	As in *church* ; never *tch* or *tsch* for this sound	Chad ; Kerch.
d‡	As in English.	
dh	Soft *th* as in *they* ; a slight *d* sound sometimes preceding it in Semitic languages	Hadhramaut ; Riyadh.
e	Long as in *eh* ? short as in *bet*. (For the *e* sound in the French *je*, see note at end on the " neutral vowel.")	Gēlo ; Mafĕking.*
(ee)	Used for *i* (*q.v.*) only in a few conventional names	Darjeeling ; Keelung.
ei	The two Italian vowels, frequently diphthongal as in *rein*, but pronounced *i* in Greek names	Beirut ; Raheita.
(eu)	Not used as a single sound.	
f	As in English ; *ph* must not be used for this sound	Mustafa ; Maidan-i-Naftun.
g	Hard, as in *get, gift* : never as in *gem, gin*	Gedáref ; Gilgit.
gh	Soft guttural, the Arabic *ghain*	Ghadames ; Baghdad.
h	Used only when sounded ; or in the compounds *ch, dh, gh, kh, sh, th, zh*	Ahmadabad ; 'Abdullah.
i	Long as in *marine* ; short as in *piano*	Fiji ; Kibonde.
j	As in English ; except in transcription of Chinese, where it equals *zh*, or the French *j*	Juba, Ujiji (Eng. *j*) ; but Jaoping (Fr. *j*).
k	As in English ; hard *c* should never be used (except in conventionally-spelt words)—thus, not Corea, Cabul, but	Korea ; Kabul.
kh	Hard aspirated guttural, as in the Scottish *loch* (not as in *lock*)	Khan ; Sebkha.
l‡ **m** **n‡**	As in English.	

*The long and short symbols given here are merely for explanation, not for use.

‡See note at end on *Liquid Sounds*.

ng	Has three separate sounds, as in *vanguard*, *finger*, and *singer*. If necessary to distinguish, a hyphen may be placed, as in *van-guard*, *singer-*.. ..	In-galla ; Bongo ; Ng-ami ; Tong-a.
ngg	May be used for the sound of *ng* as in *finger* ..	Trengganu ; Yanggang-a.
o	Long as in *both*¶ : short as in *rotund*	Kigōma ; Hŏnŏlulu.*
ö	As in German ; equals the French *eu* in *peu* ; or nearly the English sound in *fur*	Barköl.
(oo)	Used for *u* (*q.v.*) only in a few conventional names, chiefly Indian and Chinese	Poona ; Foochow.
oi	The two Italian vowels ; frequently diphthongal as in *oil*, but pronounced like *i* in *fit* in Greek names	Hanoi.
öi	The diphthong as in French *oeil* and Norwegian *höi*	Höiland.
ou	Dissyllabic, and not as French or English *ou*, except in Greek names where it has the French value	Zlatoust ; Yaroua.
ow	Used as a diphthongal combination of *ŏ* and *w* only in the romanisation of Chinese	Hankow.
p	As in English.	
ph	As in *loophole* ; not to be used for the *f*-sound, except conventionally	Chemulpho ; Haiphong.
q	Represents *only* the Arabic *qaf* and the Hebrew *qof* ; i.e. a guttural *k* (as a rule)	Qena ; Qiryath.
qu	Should never be employed to represent the sound of *kw* ; thus, not Namaqua, Quorra, but	Namakwa ; Kworra.
r	As in English ; should be distinctly pronounced.	
s‡	As English *ss* in *boss*, not as in *these* or *pleasure*	Burgos ; Masikẹsi.
sch	As in *discharge*	Peschanka.
sh **t‡**	As in English.	
th	Hard *th* as in *thick*, not as in *this* (except conventionally in Fijian)	'Athlith ; Thingvellir.
u	Long as in *rude*, or as *oo* in *boot* ; short as in *pull*	Zūlū ; Rŭanda.*
ü	As in German : equals the French *u*, as in *tu* (Fr.)	Üsküdar.
v **w** **x**	As in English.	
y	Always a consonant, as in *yard* ; it should not be used as a terminal vowel, *e* or *i* being substituted ; e.g. not Kwaly or Wady, but	Kikuyu ; Maya. Kwale ; Wadi.
z	As in *gaze*, not as in *azure*.	
zh	As the *s* in *treasure*, the *z* in *azure*, or the French *j* in *je* ; but for the sound in Chinese use *j* (*vide* note about under *j*)	Zhob.

*The long and short symbols given here are merely for explanation, not for use.

‡See note at end on *Liquid sounds*.

¶The true Italian ō is broader than this ; almost as in *broth* (=R.G.S. II *aw*). The letter *o* is conventionally used for this sound in certain names in Nigeria, Tonga, etc. : e.g. Oyo, Fofoa.

NOTES.

The doubling of a vowel or a consonant is only necessary when there is a distinct repetition of the single sound, and should otherwise be avoided	Nuusafee; Moorea; Jidda; Muhammad.
Accents should not generally be employed; but in order to indicate or emphasize the stress, an acute accent may be used	Saráwak; Qántara; Tong-atábu; Paraná.
A long or short mark over a vowel (e.g. ā, ŏ) should only be used (and that sparingly) when without it there would be danger of mispronunciation ..	Kūt; Kyōto; Abŏso.
Hyphens will not be used except to indicate pronunciation and with the particle *-i-* (in Persian, Fijian, etc.)	Ta-if; Pusht-i-Kuh; Nuku-i-Ra.

Inverted comma and apostrophe.—The inverted comma ' is employed only to represent the Arabic *'ain*, the Maltese *'ghain*, and the Hebrew *'ayin*. The apostrophe ' in foreign words indicates a liquid sound (*see* below).

Liquid sounds.—The occasional "liquid" or "palatalised" sound of *d*, *l*, *n*, *s*, *t*, etc. (as in *d'you*, *lure*, *new*, *pursue*, *tune*, etc.) is as a rule sufficiently represented by a following *y*; where, however, owing to a following consonant, or to the palatalised letter coming at the end of a word, the *y* is inapplicable, the liquid sound will be represented by an apostrophe, thus: *d'*, *l'*, *n'*, *s'*, *t'*, etc.

The "Neutral vowel."—The "indeterminate" or "neutral" vowel sound (*er*), i.e. the sound of *a* in *marine*, *e* in *often*, *i* in *stir*, *io* in *nation*, *o* in *connect*, *ou* in *curious*, *u* in *difficult*, etc., *e* in French *je*, or the often unwritten vowel (*Fat-ha*) in Arabic, etc., is represented as a rule by *a*: as in Basra, Hawiya; but sometimes by *e*, when the sound approximates more to *e* than to *a*; as Meshed, El Gezira.

(In any guide to pronunciation issued by the Permanent Committee on Geographical Names, the "neutral vowel" is represented generally by the italic *e*: occasionally also by italic *a* or *u*.)

This sound must not be-confused with *e-mute*, where the *e* is not sounded at all: as in Abbeville.

Nasal vowels.—In illustrating the pronunciation of French, Portuguese, Polish, etc., nasal vowels, the nasalisation will be represented by italic *n*; as Częstochowa pr. Chä*n*stokhóva.

Note.—The Royal Geographical Society has published a book entitled "Alphabets of Foreign Languages transcribed into English according to the R.G.S. II system." This book enables the correct rendering of names to be obtained, also of names in languages which are transliterated letter for letter.

DUTCH

Dutch belongs to the Low German group of Teutonic languages which includes Flemish, Frisian, and English. The alphabet is the same as ours; but c (except in ch, sch), q, x, and y, occur only in words of foreign origin, though y used at one time to be written for ij. In the pronunciation of the consonants Dutch resembles (High) German more closely than English. The vowels are lengthened by being doubled. The mark of diaeresis ·· is used over the second of two vowels to show that they do not form a diphthong: e.g. Mariënberg, Goënga. 's before a name is an abbreviation of des, the genitive of the definite article: e.g. 's Gravenhage = the Hague, hedge (of the Count). 't is an abbreviation of het, the definite article neuter: e.g. Stad-aan-'t Haringvliet (= town on the Herring-brook).

a, au, f, h, i, k, l, m, n, p, r, s, t, x, z, are identical with the corresponding letters in R.G.S. II. The following are different:—

Dutch.	R.G.S. II.	
aa	a	Long as in *father*: Alkmaar.
auw, aoe	au	Blauwkapel; aoe chiefly in Malay names: Laoet.
b	b, p	p when final: Hub; otherwise b.
c	s, k	s before e, i, z: Cillaarshoek; otherwise k.
ch	kh, k	(But see also sch.) Always guttural: Vechel, Utrecht. Sometimes pr. k.
d	d, t	t when final: Helmond, Sittard; otherwise d.
dj	j	Chiefly in Malay names; pr. between dy and j: Djambi.
e	*e*, e	The "neutral vowel," as *e* in French *je*, at the end of a word and in the prefixes be-, ge-, ver-, and the suffixes -el, -em, -en, -er: Eede, Bergen, Bokstel; otherwise e: Breda, pr. Bredá.
ee	e	Long, as in *eh*: Zeeland.
eeuw	e + v	if followed by a vowel: Leeuwarden;
	e + u	otherwise: Groot-Leeuwte.
ei	—	Between ai and ei: Leiden.
eu	ö	Heuvel.
g	kh	or a trifle softer and less guttural: Gelderland, Bergen, Halfweg.
ie	i	Long, as in *marine*: Biervliet.
ieuw	i + v	if followed by a vowel: Nieuwediep;
	i + u	otherwise: Nieuwstad.
ij	ai, *e*	Between ai and ei, almost as i in *ice*: Nijmegen; the neutral vowel in termination -lijk.
j	y	Joure, Oranje.
n final	—	Often omitted in pronunciation.
ng	ng	A single sound, as in *singer*: Amerongen.
oe	u	Doesburg.
oei	ui	Boeikop.
oo	ō	Long, as in *both*: Ootmarsum, Zoom.
ooi	ōi	Something like oe in *poetry*: Balgooi.
ou	au	Gouda.
ouw	au + w	if followed by a vowel: Brouwershaven;
	au	otherwise: Grouw.
qu	kw	Quirijnstok.
sch	skh, s	skh, almost sk (quite so in Friesland): Scheveningen, Terschelling; s when final: 's Hertogenbosch.
sj	sh	Sjungadijk; (except when in adjoining syllables).

DUTCH.	R.G.S. II.	
th	t	But generally occurs in adjoining syllables: Oosthuizen = Oost huizen.
tj	ch	In Malay names: Tjilatjap.
u	ü, ö, *u*	ü at the end of a syllable: Utrecht; otherwise ö: Urk, Middelburg; but before a final or a double consonant it is pr. like the "neutral vowel" *u*: Gorkum, Schuddebeurs.
ui	ai	Spoken with a touch of öi in it and the mouth open: Zuiderzee, Sluis: a difficult sound.
uu	ü	Long, as in French *nature*: Duurstede.
v	f	Soft, practically v: Vlissingen (Flushing).
w	—	Between v and w, nearer to v: Winterswijk.
y	—	Between ai and ei, almost i in *ice*; now generally written ij: IJmuiden, formerly Ymuiden.
z	—	Between s and z: Zuiderzee.

INFORMATION RELATING TO ADMIRALTY CHARTS AND PUBLICATIONS, AND GENERAL NAVIGATION.

ON THE CORRECTION OF ADMIRALTY CHARTS.

Guides to Navigation.—In addition to the charts, the navigational publications which are primarily affected by the continual changes and alterations that take place are the Admiralty Sailing Directions, the Admiralty List of Lights, Fog Signals and Visual Time Signals, and the Admiralty List of Radio Signals. The Admiralty Notices to Mariners contain information mainly for the correction of the charts and navigational publications.

CHARTS.

1. Degree of Reliance.—While the Admiralty charts can be relied upon to be correct for all information received, it should be clearly understood that the value of a chart depends on the character of the original survey and on the completeness of the reports of subsequent changes. The remarks on "The Use of Charts as Navigational Aids, &c.", which are subjoined should be carefully studied in this connection.

2. System of Dating and Issue of Corrected Copies.—Admiralty charts after first publication are kept corrected by means of new editions, large corrections, and small corrections. Copies of charts issued by the Hydrographic Supplies Establishment, Admiralty Chart Agents or Admiralty Chart Depôts are corrected, except from temporary and preliminary Notices to Mariners, for all navigational information to the date of issue.

New charts.—The date of publication of a chart is shown outside the bottom margin, in the middle, e.g. :—

Published at the Admiralty 30th May, 1938.

New Editions.—When a chart is revised throughout and modernised in style a new edition is published, the date being shown outside the bottom margin and to the right of the date of publication, e.g. :—

New Edition 2nd Jany., 1938.

All large and small corrections notations are at the same time erased, and all old copies of the charts are cancelled.

Large Corrections.—When a chart is corrected from important information which is too comprehensive to promulgate by Admiralty Notice to Mariners or to insert conveniently by hand on existing copies, but when the chart is not revised throughout, the date on which these corrections are made is shown on the chart outside the bottom margin and to the right of the date of publication, and in the case of a chart already marked with a new edition date, below such date, e.g. :—

Large corrections 10th Feb., 1938.

All small corrections notations are at the same time erased, and all copies of the chart are cancelled.

Small Corrections.—

(*i*) When a chart is corrected from the information promulgated in an Admiralty Notice to Mariners (except temporary and preliminary Notices), the year, if not already shown, and number of the notice are entered in the bottom left-hand corner of the chart, e.g.:—

Small corrections 1938-*903*.

Copies of the chart stocked by the Hydrographic Supplies Establishment, Admiralty Chart Agents and the Admiralty Chart Depôts are corrected by hand from such information.

(*ii*) When a chart is corrected from information which is considered of no importance from the standpoint of safe navigation, and which is, therefore, not promulgated in an Admiralty Notice to Mariners, the year, if not already shown, and date of the correction are entered on the chart, in one of two ways, in the bottom left-hand corner below the margin and in sequence with the notations referred to in the preceding paragraph, e.g.:

Small corrections, 1938—$\boxed{5.20}$—

or Small corrections 1938—(VI.*25*)

These indicate that the chart received minor corrections on the 20th May or 25th June, respectively.

In such cases copies of the chart held by ships and establishments are not usually replaced by new copies, but in exceptional cases, e.g., when new compasses are inserted, new copies of the charts may be supplied. It should, however, be particularly noted that the absence of corrections represented by square or bracket dates from a chart does not invalidate it for navigation.

3. Correction of Charts in Ships.—All small but important corrections affecting navigation that can be made to the charts by hand are promulgated in Admiralty Notices to Mariners and, with the exception of corrections from temporary or preliminary Notices, should at once be neatly made in waterproof violet ink on the charts affected, the year (if not already shown) and numbers of the notices being inserted, also in waterproof violet ink, in the bottom left-hand corner of the chart. The recognised abbreviations shown on Admiralty chart No. 5011 ("Signs and abbreviations used on Admiralty Charts") should be used.

Generally speaking, the amount of information which should be inserted on a chart should be in accordance with that already shown.

On large scale charts, the abridged descriptions, as shown on chart No. 5011, of all details of all lights, light-buoys and fog signals, and the year dates of obstructions, reported shoals, dredged channels, depth on bars or in shifting channels, and irregularities of lights, should be inserted.

On coastal charts, the abridged descriptions of only the principal lights and fog-signals, i.e., those to assist in approaching or making the land, should be inserted.

Particulars of such lights should be omitted, in the following order, as the scale of the chart decreases, viz.:—

(i) Elevation, (ii) Period, (iii), Number in Group, and (iv) Visibility.

Particulars of fog signals should be inserted in their appropriate positions if space permits, but should otherwise be entered in a tabulated list under the title or some other convenient place on the chart.

Inner harbour light-buoys and beacons should not be inserted on coastal charts, and against other light-buoys only the character of the light should be inserted.

On ocean charts, lights which are visible 15 miles or over should alone be inserted and then only their character and colour.

On all charts, writing should be inserted as much as possible clear of the water, unless the relative objects are on the water and care should be taken not to obliterate any information already on the chart. When cautionary or tidal notes, &c., are inserted, they should be written in a convenient but *conspicuous* place, preferably near the title, where they will not interfere with other details.

Erasures should never be made but the details should, when necessary, be crossed through in waterproof violet ink.

Admiralty Notices to Mariners are occasionally accompanied by reproductions of portions of charts (known as "blocks",) and when correcting charts from such blocks the following points should be borne in mind:—

(i) A block may not only indicate the insertion of new information, ***but also the omission of matter previously shown.*** The latter would, however, invariably be mentioned in the text of the Notice, and the fact that a block accompanies a Notice should not cause the text of the Notice to be disregarded.

(ii) The limiting lines of a block are determined for convenience of reproduction and need not be adhered to when cutting out for pasting on the chart, provided that the point mentioned in the preceding paragraph is taken into consideration.

(iii) The new information shown on a block can sometimes be inserted on the chart by hand, the reason for issuing a block in such a case being to avoid a long description of the new information in the text of the Notice.

(iv) Owing to distortion the blocks do not always fit the charts exactly, care should therefore be taken when pasting a block on to a chart that the more important navigational corrections fit as closely as possible. This can best be assured by fitting the block while it is dry and making two or three pencil ticks round the edges for use as fitting marks after the paste is applied.

Corrections from Temporary or Preliminary Notices to Mariners should be inserted on the charts *in pencil* and the year and number of the notice should be shown against them, e.g.:—N.M. $\frac{742}{1938}$ temp. and also in the bottom left-hand corner of the chart, in pencil, *below* the small corrections notations (*see* above). Temporary corrections should be rubbed out when the notice is received cancelling them, but preliminary corrections should be inked in when the notice is received reporting that the changes have been made.

Charts stocked by the Hydrographic Supplies Establishment, Admiralty Chart Agents and the Admiralty Chart Depôts are *not* corrected from Temporary or Preliminary Notices to Mariners, and when charts are received from one of these sources they should be corrected in pencil as necessary from the copies of such Notices already held, or from those supplied with the charts.

Corrections from Radio Navigational Warnings concerning derelicts and drifting obstructions, the temporary extinction of lights, displacement of important aids to navigation, ice reports, &c., should also be noted *in pencil*, as received, on the charts affected. Radio Navigational Warnings of a permanent nature and those relating to derelicts and drifting obstructions dangerous to navigation are re-issued in the form of Admiralty Notices to Mariners, but other warnings are not re-issued in this way, except in special circumstances.

Corrections from information received from authorities other than the Admiralty should be noted, *in pencil*, on the charts affected, but no charted danger is to be expunged without the authority of the Hydrographer of the Navy.

NAVIGATIONAL PUBLICATIONS.

Admiralty Sailing Directions, Supplements, &c.

1. The Admiralty Sailing Directions, consisting of about 70 volumes for the whole world, contain general information useful to the navigator.

An index chart bound near the beginning of each volume shows the area dealt with and the serial numbers and limits of all Admiralty charts for the area which were published *when the volume was printed*.

Each volume is periodically revised throughout, and, in the intervals between the publication of new editions, Admiralty Notices to Mariners and Supplements are published to enable the volume to be corrected. It should, however, be clearly understood that Sailing Directions cannot be correct in all minor details after the date of the latest Supplement.

The above-mentioned corrections are not made in the Sailing Directions stocked by the Hydrographic Supplies Establishment, Admiralty Chart Agents or the Admiralty Chart Depôts.

A new edition of each volume of Sailing Directions is published at intervals of approximately from ten to twelve years. The number of the latest Admiralty Notice to Mariners used in its compilation is given in the "Advertisement" on page iii of each volume, and the numbers of the Notices affecting it between the dates of going to press and issue to ships and establishments are given in the Notice announcing its publication, to enable the new edition to be corrected before being brought into use.

A Supplement to each volume is generally published annually, each succeeding Supplement cancelling the former. When a volume is taken up for revision, however, no further Supplement to that edition is issued, but subsequent Notices to Mariners affecting it are summarised each year and issued as a separate publication, until the new edition of the volume is published.

A tabular form for notation of the existence of Supplements and Summaries of Notices is printed on the front fly-leaf of all Sailing Directions, and these notations are made as necessary in all copies issued by the Hydrographic Supplies Establishment and the Admiralty Chart Depôts.

Supplements and Summaries of Admiralty Notices to Mariners should be retained intact. *Whenever reference is made to the Sailing Directions, the Supplement must be consulted.* The existence of a Supplement or Summary of Admiralty Notices to Mariners is to be entered in the tabular form inside the cover of the Sailing Directions.

Admiralty Notices to Mariners affecting Sailing Directions *are not* to be cut up and pasted in, but the book is to be annotated in the margin, or corrected in manuscript, as convenient.

2. **The Admiralty List of Lights, Fog Signals and Visual Time Signals.**—The Admiralty List of Lights, Fog Signals and Visual Time Signals for the world is issued in twelve volumes divided geographically as shown on the index chart at the beginning of each volume.

Light-buoys are *not* included in the list.

The volumes are published annually at the rate of one volume per month commencing with Volume I in January and ending with Volume XII in December. Supplements to these volumes will not be issued.

Each volume will be issued with an inscription on its cover and title page stating the date to which the volume has been corrected which will be approximately six weeks prior to the date of its issue. Permanent and temporary corrections or additions to each volume which may occur between the date of correction and date of issue, will be promulgated by Section III of Admiralty Notices to Mariners.

AMENDMENTS

Important amendments are promulgated in Admiralty Notices to Mariners. In Section IIIA of each Weekly Complete Edition of these Notices will be found all additions and alterations made to Lights, Fog Signals and Visual Time Signals by the Notices issued during the week affected; certain other additions and alterations are also included in Section IIIA, which, though not of sufficient importance to necessitate the issue of a Notice to Mariners, will be found of use to the seaman. Section IIIB contains similar information but of a temporary character; Section IIIC also contains temporary information but consists of a list of lights and fog signals extinguished or inoperative on account of damage sustained during the war.

Corrections to the Light Lists should be made in pencil, or extracted from Section III and pasted in the appropriate volume.

NOTE : Corrections are not made in copies of the Lists of Lights, etc., stocked by the Hydrographic Supplies Establishment, Admiralty Chart Agents or the Admiralty Chart Depots, and copies received from these sources should accordingly be corrected from the weekly editions of the Notices to Mariners before being brought into use.

3. **The Admiralty List of Radio Signals.**—The Admiralty List of Radio Signals is issued in three volumes.

Volume I.—Communications—Comprises particulars of radiotelegraph coast stations, together with general regulations; it also includes such subsidiary services as medical advice supplied by radio, together with details of the organisation for transmitting British official messages to merchant ships.

Volume II.—Navigational Aids—Comprises particulars of services from direction-finding stations and radiobeacons, together with radio time signals and navigational warnings (with ice signals); all relevant codes and regulations will be found in this volume.

Volume III.—Meteorological Services—Comprises particulars of weather services provided for the use of shipping, together with relevant codes and lists of meteorological observation stations.

New editions of each volume will normally be published annually. A supplement to each volume is also issued.

These Supplements embody corrections subsequent to the date of going to press, and are issued gratis with each volume. All corrections later than those included in the Supplement are promulgated in Section IV of the complete weekly edition of Admiralty Notices to Mariners.

Copies of the List stocked by the Hydrographic Supplies Establishment, Admiralty Chart Agents or the Admiralty Chart Depôts are not kept corrected, and Lists received from these sources should accordingly be corrected from the Supplements and from the weekly editions of the Admiralty Notices to Mariners before being brought into use.

4. The Admiralty Tide Tables.—The Admiralty Tide Tables are published in three sections as follows:—

For " Home Waters (British Isles, Europe and North coast of Africa)."

For " Atlantic and Indian Oceans."

For " Pacific Ocean and Adjacent Seas."

Each section contains two parts, Part I giving tidal predictions for Standard Ports, and tidal stream predictions for certain straits and channels ; Part II giving data for predicting tides at places which are not Standard Ports.

Admiralty Tide Tables, Part III, contains instructions for predicting tides and tidal streams, and for analysing observations of tides and tidal streams, with tables to assist prediction and analysis.

THE USE OF CHARTS AS NAVIGATIONAL AIDS AND GENERAL REMARKS RELATING TO PRACTICAL NAVIGATION.

Reliance on a chart.—The value of a chart must manifestly depend upon the accuracy of the survey on which it is based, and this becomes more important the larger the scale of the chart.

To estimate this the date of the survey, which is always given in the title, is a good guide. Besides the changes that, in waters where sand or mud prevails, may have taken place since the date of the survey, the earlier surveys were mostly made under circumstances that precluded great accuracy of detail, and, until a plan founded on such a survey is tested, it should be regarded with caution. It may, indeed, be said that, except in well-frequented harbours and their approaches, no surveys yet made have been so minute in their examination of the bottom as to make it certain that all dangers have been found. The fullness or scantiness of the soundings is another method of estimating the completeness of a chart. When the soundings are sparse or unevenly distributed, it may be taken for granted that the survey was not in great detail.

It appears to be insufficiently realised that the degree of reliance which may reasonably be placed upon an Admiralty chart, even in surveys of modern date, is mainly dependent on the scale on which the survey was made. The scale for publication is now generally that of the original survey, except in the case of coast sheets which are sometimes reduced. It should not, therefore, be assumed that the original survey was made on a larger scale than that published.

It must be borne in mind that the principal method of ascertaining the inequality of the bottom of the sea is by the laborious process of sounding, and that in sounding over any area, the boat or vessel obtaining the soundings is kept on given lines; that each time the lead descends, or a sonic sounding is taken, the depth over only a small area is obtained, in the case of the lead, it has a diameter of only a few inches, and that consequently each line of soundings, though miles in length, is only to be considered as representing a narrow width.

Surveys are not made on uniform scales, but each survey is made on a scale commensurate with its apparent importance. For instance, a general survey of a coast, which vessels only pass in proceeding from one place to another is not usually made on a scale larger than one inch to the nautical mile, while surveys of areas where vessels are likely to anchor, are made on a scale of three inches to the mile, and surveys of frequented ports or harbours likely to be used by fleets, on a scale of from six inches to ten inches to the nautical mile.

Close examination by sounding is the only method by which surveys on a large scale can be made, and in view of the vast mileage of surveys yet requiring completion in the interests of navigation, it would be a waste of time to undertake large scale coast surveys.

The scale on which a survey is to be conducted having been settled, it is manifestly superfluous to obtain more lines of soundings than can be represented on the paper. 100 soundings, which is the maximum number that can be placed with clearness on every square inch of paper, means that on a scale of one inch to the mile each sounding on the chart occupies an area representing eight acres of actual ground, whilst on a scale of six inches to the mile each sounding represents an area of a little less than a quarter of an acre, i.e., of 100 feet square.

The following diagram represents as many soundings as can be placed legibly on a square inch of paper:—

16	15	15	13	13	14	12	11	10	9
14	15	14	14	13	13	12	11	9	8
15	15	14	17	16	14	13	10	10	9
16	16	17	18	16	12	11	8_3	9	10
18	17	15	12	9	7_3	7_4	7_4	9	10
19	16	12	9	5_3	4_4	5_4	6_4	8_3	9
22	19	16	10	3_4	5_1	6_1	7_3	8_3	10
20	16	12	7_1	5_4	6_1	6_4	7_1	8_3	10
18	15	11	9	7_3	7	7_3	8_3	10	11
20	17	14	11	12	10	9	10	11	13

Little assistance in detecting excrescences on the bottom is afforded by the eye, when sounding in a boat, even in clear weather, on account of the observer being within five feet of the surface; none in turbid seas. If, therefore, there is no inequality in the soundings to cause suspicion, a shoal patch between two lines may occasionally escape detection.

Thus, in a chart on a scale of one inch to the mile, an inequality of some acres in extent rising close to the surface, if it happened to be situated between two lines, might escape detection; whilst in a chart on a scale of 6 inches, inequalities as large as battleships, if lying parallel with, and between the lines of soundings, might exist without detection if they rose abruptly from an otherwise even bottom.

General coast charts should not, therefore, be looked upon as infallible, and a rocky shore should on no account be approached within the ten-fathom contour line, without taking every precaution to avoid a possible danger; and even with surveys of harbours on a scale of 6 inches to the mile vessels should avoid, if possible, passing over charted inequalities in the ground, as some isolated rocks are so sharp that the lead may not find the highest part. Better results can, however, be obtained by sonic sounding owing to the rapidity with which such soundings can be taken, but even this method will not find rocks unless the boat or vessel be directly over them.

Blank spaces among soundings mean that no soundings have been obtained in these spots. When the surrounding soundings are deep it may with fairness be assumed that in the blanks the water is also deep; but when they are shallow, or it can be seen from the rest of the chart that reefs or banks are present, such blanks should be regarded with suspicion.

Soundings in hair line, which are shown on the latest charts in upright figures, and on other charts in sloping figures, indicate that such soundings have been taken from smaller scale charts, an unreliable source, or adapted from old and imperfect surveys.

Fathom lines a caution.—Except in plans of harbours that have been surveyed in detail, the six-fathom line on most Admiralty charts is to be considered as a caution or danger line against unnecessarily approaching the shore or bank within that line, on account of the possibility of the existence of undiscovered inequalities of the bottom, which nothing but an elaborate detailed survey could reveal. In general surveys of coasts or of little frequented anchorages, the necessities of navigation do not demand the great expenditure of time required for such a detailed survey. It is not contemplated that ships will approach the shore in such localities without taking special precautions.

The ten-fathom line, is on rocky shores, as before mentioned, another warning, especially for ships of deep draught.

Charts on which no fathom lines are marked must be especially regarded with caution, as it generally means that soundings were too scanty and the bottom too uneven to enable them to be drawn with accuracy.

Isolated soundings, shoaler than surrounding depths, should always be avoided as there is no knowing how closely the spot may have been examined.

Chart on largest scale always to be used.—It sometimes happens that from press of work, only the copper plate of the larger scale chart of a particular locality can at once receive any extensive re-arrangement of coastline or sounding. This is an additional reason, besides the obvious one of the greater detail shown, why this largest scale chart should always be used for navigating.

Caution in using small scale charts.—In approaching the land or dangerous banks, regard must always be had to the scale of the chart used. A small error in laying down a position means only yards on a large-scale chart, whereas on a small scale the same amount of displacement means large fractions of a mile.

For the same reason bearings to near objects should be used in preference to objects farther off, although the latter may be more prominent, as a small error in bearing or in laying it down on the chart has a greater effect in misplacing the position the longer the line to be drawn.

Graduation.—All plans are now being graduated in skeleton style before publication in order to facilitate easy reference to astronomical positions; previously published plans are also graduated as opportunity offers. The graduation is, however, of necessity often based upon imperfect information of a conflicting nature; for this reason, whenever an astronomical position is quoted other than approximate (i.e., when seconds are given), it is necessary to quote also the number of the particular chart from which the position has been derived.

In this connection it is pointed out that, whenever possible, a position should be transferred from one chart to another by bearing and distance from a distinguishing feature common to both, such as a point of land or a light, &c., and not by the graduation which may differ owing to one of the charts being constructed on later and more complete astronomical data than the other.

Distortion of printed charts.—The paper on which charts are printed is, from various causes, subject to distortion, but the effect of this is seldom sufficient to affect navigation. It must not, however, be expected that accurate series of angles taken to different points will always exactly agree when carefully plotted upon the chart, especially if the lines are to objects at some distance. The larger the chart the greater the amount of this distortion.

Buoys.—It is manifestly impossible that any reliance can be placed on buoys always maintaining their exact position. Buoys should, therefore, be regarded as warnings and not as infallible navigating marks, especially when in exposed positions; and a ship should always, when possible, be navigated by bearings of fixed objects on shore or angles between them, and not by buoys.

Light-buoys.—The lights shown by light-buoys cannot be implicitly relied on, as, if occulting or flashing, the apparatus may get out of order, or the light may be altogether extinguished. These lights in the British isles are from 5 to 217 candle power.

Cable-buoys.—Cable-buoys marking the ends of submarine cables usually are spherical or can shaped, surmounted by a globe and occasionally a flag. Below the topmark two *white fixed* lights, disposed horizontally, may be exhibited, but they cannot be implicitly relied on.

Lights.—Arcs drawn on charts round a light are not intended to give information as to the distance at which it can be seen, but solely to indicate, in the case of lights which do not show the same characteristics or colours in all directions, the bearings between which the differences occur.

All the distances given in the Admiralty List of Lights and on the charts for the visibility of lights are calculated for a height of an observer's eye of 15 feet. The table of distances visible due to elevation at the beginning of each part of the Admiralty List of Lights, affords a means of ascertaining how much more or less the light is visible should the height of the eye be more or less. The glare of a powerful light is often seen far beyond the limit of visibility of the actual rays of the light, but this must not be confounded with the true range. Again, refraction may often cause a light to be seen farther than under ordinary circumstances.

When looking out for a light at night, the fact is often forgotten that from aloft the range of vision is much increased. By noting a star immediately over the light a very correct bearing may be afterwards obtained from the standard compass.

The intrinsic power of a light should always be considered when expecting to make it in thick weather. A weak light is easily obscured by haze, and no dependence can be placed on its being seen.

The power of a light can be estimated by remarking its candle power, as given in the Admiralty List of Lights, and in some cases by noting how much its visibility in clear weather falls short of the range due to the elevation at which it is placed. Thus, a light standing 200 feet above the sea, and only recorded as visible at 10 miles in clear weather, is manifestly of little brilliancy, as its elevation would permit it to be seen over 20 miles, if of any power. (*See* table in the Admiralty List of Lights.)

The distance from a light cannot be estimated either by its brilliancy or its dimness.

On first making a light from the bridge, by at once lowering the eye several feet and noting whether the light is made to dip it may be determined whether the vessel is in the circle of visibility corresponding with the usual height of the eye or unexpectedly nearer the light.

Fog signals.—Sound is conveyed in a very capricious way through the atmosphere. The following points in regard to fog signals should be borne in mind:—

(*a*) Fog signals are heard at greatly varying distances.
(*b*) Under certain conditions of atmosphere, when an air fog signal is a combination of high and low tones one of the notes may be inaudible.
(*c*) There are occasionally areas around a fog signal in which it is wholly inaudible.
(*d*) A fog may exist a short distance from a station and not be observable from it, so that the signal may not be sounded.
(*e*) Some fog signals cannot be started at a moment's notice after signs of fog have been observed.

Mariners are therefore warned that fog signals cannot be implicitly relied upon, and that *the practice of sounding should never be neglected.* Particular attention should be given to placing "Look-out men" in positions in which the noises in the ship are least likely to interfere with the hearing of the sound of an air fog signal; as experience shows that, though such a signal may not be heard from the deck or bridge when the engines are moving, it may be heard when the ship is stopped, or from a quiet position. It may sometimes be heard from aloft though not on deck.

Great assistance may be obtained from the radiobeacons at many important lighthouses and light-vessels, but the attention of Mariners is called to the serious dangers which may arise from their misuse. No attempt should be made to approach such a position on a radio bearing, whilst relying only on hearing the sound fog signal in sufficient time to alter course to avoid danger. When the radio fog signal is transmitted from a light-vessel, it is essential in order to avoid collision, that the bearing from the light vessel should not be kept constant.

Tides.—In navigating coastal waters where the range of the tide is considerable, caution is always necessary. The tidal predictions for Standard ports in the Admiralty Tide Tables can generally be relied upon to give the times of high and low water to within a few minutes, and heights within a few tenths of a foot. Larger errors are to be expected in the predictions for places which are not Standard ports, computed from the data in Part II, but such predictions computed from the harmonic constants are always sufficiently accurate for the general requirements of navigation. For Standard Ports the heights of the tide at times between high and low water may usually be found within narrow limits in accordance with the instructions in Parts I and III of the Tide Tables.

The datums of Admiralty charts depending on Admiralty surveys vary with the type of tide, but usually conform with the International agreement, that datum should be " a plane so low that the tide will but seldom fall below it." The datums used by different nations, however, differ very considerably and those of Admiralty charts depending on foreign surveys are always those used by the original surveyors, which vary from " lowest possible low water " to " mean low water" in tidal waters, and are usually mean sea level in non-tidal waters.

The datum used is always stated on large scale Admiralty charts.

Caution.—Most datums are above the lowest level to which the tide may fall; the charts therefore do not always show minimum depths.

Tidal streams.—Where the tidal streams are semi-diurnal information regarding them is usually given, in a convenient part of the chart, in tabular form or by notes, special symbols being inserted at the positions to which the information refers. In certain cases, where the information available is incomplete, the streams are indicated by means of arrows.

There are many places where the tidal streams cannot be predicted by reference to the tide at a Standard Port. Although no data for predicting the times at which they flow is given, their general direction is, in many cases, indicated by arrows on the charts. For a few of the straits and channels, where these conditions exist, tidal stream predictions are given in the Admiralty Tide Tables.

Tidal streams, particularly if rotary, may vary considerably both in direction and rate; predictions of the stream must therefore always be considered approximate.

The turn of the tidal stream is not usually coincident with the times of high and low water; in fact, though in estuaries, harbour entrances, &c., the stream usually turns at about the times of high and low water, in open channels, and along open coasts generally, the turn usually occurs more nearly at half tide. Predictions of the times of high and low water must therefore never be used as predictions of the times of slack water.

It should be remembered that, even where the general direction of the stream is parallel with the shore, an indraught is usually experienced when crossing the entrances to bays and inlets.

Fixing positions.—For further information on this subject, *see* Admiralty Manual of Navigation.

When in sight of land, every opportunity should be taken of fixing the ship's position by terrestrial objects.

The most usual method is by compass bearings of suitable objects, and it must be borne in mind that a fix by only two bearings is liable to error, either an absolute error in taking the bearings, or those made in applying the deviation or in laying the bearings off on the chart. For these reasons, a third or check bearing of some other object should, when possible, be taken, especially when near the shore or dangers. The intersection of these three lines on the chart will prevent any mistakes if the objects are suitably placed.

The most accurate method of fixing a position is by angles between well-defined objects on the chart. All ships are supplied with a station pointer, and this method should be used whenever possible.

Two conditions are, however, necessary for its successful employment; first that the objects be well chosen, and, second, that the observer is skilful, and rapid in his use of the sextant and station pointer. For the former, reference can be made to the pamphlet on the use of the station pointer; the latter is only to be obtained by practice.

It will readily be seen that the sextant offers great advantages, as angles can be obtained from any position whence the objects are visible.

In many narrow waters also, where the objects may yet be at some distance, as in coral harbours, or narrow passages among mud banks, navigation by sextant and station-pointer is invaluable, as a true position can only be obtained by its means. A small error in either taking or plotting a bearing under such circumstances may put the ship ashore.

In all cases where great accuracy of position is desired, such as the fixing of a rock or shoal, or the addition to a chart of fresh soundings or new buildings, angles should invariably be used. These should be taken to several objects, the more the better, but five objects is a good number, as the four angles thus obtained not only prevent any errors, but also furnish a means of checking the accuracy of the chart itself. When running a line of soundings, it is only necessary to take a third angle now and then; firstly to make certain that the more important soundings, as at the end of a line, are correctly placed, and, secondly, to check the general accuracy of the chart.

Attention is also directed to the very useful and handy method of fixing by the bearing and distance of a suitable object.

Should the ship be supplied with a rangefinder, its use here is obvious, but without one a very good approximate distance of an object of known height may be obtained, by observing its angle of elevation and obtaining the distance from Lecky's Offshore Distance Tables, which are supplied with all sets of charts. Full directions for the use of these Tables are given with them.

Sometimes, when only one of the requisite objects is visible from the standard compass, a compass bearing of it and a sextant angle to the other may be used to fix the position.

The method of fixing by doubling the angle on the bow is useful when passing points of land, &c., in waters where there is either no tidal stream or current, or where this can be estimated with sufficient accuracy. This method is as follows:—

Suppose that the angle between the ship's head and an object is measured, and found to be X°, and that the time of the observation is noted. Suppose also that the time is again taken when the angle between the ship's head and the object is 2X°. Then, if the course made good is the course steered, the distance of the ship from the object, at the time that the second bearing was taken, is equal to the run (over the ground) in the interval. Hence the ship's position can at once be laid off as a bearing and distance from the object. In practice, the angle X° should not be less than about 25°.

The most usual form of this method, the so-called "four point bearing," gives an excellent fix for a departure but does not ensure safety, as the point with its outlying dangers is abeam before the position is obtained.

The above fix is only reliable if either there is no tidal stream or current, or if the stream is running directly with or against the course of the ship; if otherwise, or if leeway is to be allowed for, the above method should never be used, but the ship's position should be obtained by plotting the two bearings and the estimated course and distance made good in the interval.

A table "Distance of an object by two bearings," is supplied with certain chart folios, and is also given in Inman's Tables, by which the ship's position at the time of the second bearing can be found; any two bearings at a suitable angle to each other may be used, together with the run between them, but, again, this table should not be used when the vessel is subject to a cross tidal stream or leeway.

The use of the danger angle in passing outlying dangers with land behind them, should also not be forgotten. A vertical danger angle is useful when the danger lies off an object such as a lighthouse, the height of which is known; the angle being obtained from the aforesaid Lecky's Tables. If a horizontal danger angle between two objects is used, however, caution is necessary, as, should the objects not be correctly placed on the chart, the angle taken from it may not serve the purpose. This method should not, therefore, be employed when the survey is old or manifestly imperfect.

When fixing by astronomical observations, attention is drawn to the great utility of the position line. Even a single position line may at times give invaluable information, as the ship must be somewhere on this line, provided that the chronometer is correct.

A sounding obtained at the same time may often serve to give an approximate position. Again, by steering along, or at a required distance parallel to, a single position line, a vessel may make her port or avoid a danger, although uncertain of her position.

A very accurate position may be obtained by observations of two or more stars at evening or morning twilight, or by the observation of a bright star at daybreak, and another, shortly afterwards, of the sun when a few degrees above the horizon. The position lines obtained from the bodies observed should differ in azimuth by 30° or more.

Mariners are also reminded that, with modern tables for correcting the altitude, observations of the moon entail practically no more calculation than those of a planet. Moon sights are sometimes available when stars are obscured by light cloud, &c.; also an excellent position may frequently be obtained by simultaneous observations of the sun and moon.

Great use may be made of radio bearings for fixing the ship, full details of this method, and its limitations, are given in the Admiralty List of Radio Signals.

Observations for Errors of the Compass.—No opportunity should be neglected of checking the deviations of the standard compass. When coasting, and a well surveyed and fairly large scale chart is available, an excellent method of observing the deviation is by taking the compass bearing of two suitable objects when in transit, and comparing this with the magnetic bearing from the chart; provided always that the objects are not too close together; also by using any leading lines, the true bearings of which are being indicated in degrees and minutes on the charts, when they are accurately known. When these methods are not available, the deviation should be obtained by azimuths of a heavenly body.

Deviations should be observed on any change of course on which the ship is steadied for any material space of time; if steering a steady course, the compass error should be observed at least twice a day.

Change of variation of the compass.—The gradual change in the variation must not be forgotten in laying down positions by bearing on charts. The magnetic compasses placed on the charts for the purpose of facilitating plotting become in time slightly in error, and in some cases, such as with small scales, or when the lines are long the displacement of position from neglect of this change may be of importance. The compasses are re-engraved when the error amounts to a degree, but the chart plates cannot be corrected more frequently from the impossibility of making alterations often on one spot in a copper plate.

The geographical change in the variation is in some parts of the world sufficiently rapid to need consideration. For instance, in approaching Halifax from Newfoundland the variation changes 10° in less than 500 miles, and in the English channel about 5° in 400 miles. The Variation chart should be consulted on this head.

On certain general charts embracing large areas with considerable change of variation, true compasses are placed instead of magnetic compasses, the variation being shown by *isogonic lines* (curves of equal magnetic variation), in a similar manner to the Variation chart. One or two *isogonic lines* are also sometimes placed on charts, in addition to the magnetic compasses, in order to indicate the general direction of these curves, and thus facilitate the determination of the variation to be employed in portions of the chart not in immediate proximity to any one of the engraved compasses. Magnetic Variation values shown on Admiralty charts are for the 1st July of the year mentioned.

Local magnetic disturbance of the compass on board ship.—The term "local magnetic disturbance" has reference only to the effects on the compass of magnetic masses external to the ship in which it is placed. Observation shows that such disturbance of the compass in a ship afloat is experienced only in a few places on the globe. Magnetic laws do not permit of the supposition that it is the visible land which causes such disturbance, because the effect of a magnetic force diminishes in such rapid proportion as the distance from it increases that it would require a local centre of magnetic force of an amount absolutely unknown to affect a compass half a mile distant.

Such deflections of the compass are due to magnetic minerals in the bed of the sea under the ship, and when the water is shallow, and the force strong, the compass may be temporarily deflected when passing over such a spot, but the area of disturbance will be small, unless there are many centres near together.

They may also be due to wrecks lying on the bottom in moderate depths, but investigations have proved that, while deflections of unpredictable amount may be expected when very close to such wrecks, it is unlikely that deflections in excess of 7° will be experienced, nor should the disturbance be felt beyond a distance of 250 yards.

It is very desirable that whenever a ship passes over an area of local magnetic disturbance, the position should be fixed, and the facts reported as far as they can be ascertained.

Use of oil for modifying the effect of breaking waves.—Many experiences of late years have shown that the utility of oil for this purpose is undoubted, and the application simple.

The following may serve for the guidance of seamen, whose attention is called to the fact that a very small quantity of oil, skilfully applied, may prevent much damage both to ships (especially the smaller classes) and to boats, by modifying the action of breaking seas.

The principal facts as to the use of oil are as follows:—

1. On free waves, i.e., waves in deep water, the effect is greatest.

2. In a surf, or waves breaking on a bar, where a mass of liquid is in actual motion in shallow water, the effect of the oil is uncertain, as nothing can prevent the larger waves from breaking under such circumstances; but even here it is of some service.

3. The heaviest and thickest oils are most effectual. Refined kerosene is of little use; crude petroleum is serviceable when nothing

else is obtainable; but all animal and vegetable oils, such as waste oil from the engines, have great effect.

4. A small quantity of oil suffices, if applied in such a manner as to spread to windward.

5. It is useful in a ship or boat, both when running, or lying to, or in wearing.

6. No experiences are related of its use when hoisting a boat up in a sea-way at sea, but it is highly probable that much time and injury to the boat would be saved by its application on such occasions.

At anchor, when the sea is sufficient to render it difficult to hoist up or in boats, oil bags from forward or from the swinging booms have been found to render the sea alongside comparatively smooth.

7. In cold water, the oil, being thickened by the lower temperature, and not being able to spread freely, will have its effect much reduced. This will vary with the description of oil used.

8. The best method of application in a ship at sea appears to be: hanging over the side, in such a manner as to be in the water, small canvas bags, capable of holding from one to two gallons of oil, such bags being pricked with a sail needle to facilitate leakage of the oil.

The position of these bags should vary with the circumstances. Running before the wind they should be hung on either bow—e.g., from the cathead—and allowed to tow in the water.

With the wind on the quarter the effect seems to be less than in any other position, as the oil goes astern while the waves come up on the quarter.

Lying to, the weather bow and another position farther aft seem the best places from which to hang the bags, with a sufficient length of line to permit them to draw to windward, while the ship drifts.

9. Crossing a bar with a flood tide, oil poured overboard and allowed to float in ahead of the boat which would follow with a bag towing astern, would appear to be the best plan. As before remarked, under these circumstances the effect cannot be so much trusted.

On a bar with the ebb tide it would seem to be useless to try oil for the purpose of entering.

10. For boarding a wreck, it is recommended to pour oil overboard to windward of her before going alongside. The effect in this case must greatly depend upon the set of the current, and the depth of the water.

11. For a boat riding in bad weather from a sea anchor, it is recommended to fasten the bag to an endless line rove through a block on the sea anchor, by which means the oil is diffused well ahead of the boat, and the bag can be readily hauled on board for refilling if necessary.

12. Towing a vessel in a heavy sea, oil is of the greatest service, and may prevent parting the hawser. Distribute from the towing vessel forward and on both sides; if used only aft the tow alone gets the benefit.

Tropical revolving storms, and practical rules for avoiding them.—

1. Tropical revolving storms or cyclones occur for the most part in the tropical or sub-tropical portions of the western sides of the great oceans, with the exception of the South Atlantic ocean where they are unknown. They occur also on the eastern sides of the North Pacific and South Indian oceans, in the Arabian sea and the Bay of Bengal.

2. Revolving storms are so named because the wind in these storms revolves round an area of low pressure situated in the centre. The

direction of revolution is anti-clockwise in the northern hemisphere and clockwise in the southern hemisphere. The wind, however, does not revolve round the centre of low pressure in concentric circles but has a spiral movement inwards, towards the centre.

3. Tropical storms are known by various names according to the locality in which they are experienced. In the West Indies, on the Pacific coast of Central America and in the South Pacific ocean they are called hurricanes: in the Indian ocean, Arabian sea and Bay of Bengal, cyclones: and in the western part of the North Pacific, typhoons.

4. These storms generally originate between the parallels of 5° and 20° of latitude in both hemispheres and as a rule have initially a progressive movement westward, subsequently recurving towards the pole of the hemisphere in which they are generated. Thereafter, they tend to move north-eastward in the northern hemisphere and south-eastward in the southern hemisphere, so that they invade the temperate latitudes where they may gradually acquire the characteristics of the depressions of such latitudes.

5. Tropical storms are most frequent towards the end of the hot season in both hemispheres. In the Arabian sea and Bay of Bengal, however, they have their maximum frequency and are most dangerous during the transition periods at the beginning and end of the monsoon.

6. The diameter of revolving storms may vary from twenty to some hundreds of miles. Their average rate of progress when moving westward is about 10 knots, but after recurving their average speed increases to about 20 knots. It should be remembered, however, that very great variations from these speeds are likely to occur, and especially after recurving the storms sometimes move very quickly, their rate of travel then occasionally being as much as 50 knots.

7. The winds associated with tropical storms are extremely violent, but in the centre, or eye of the storm, light variable breezes or squalls alternating with complete calms are usually encountered. In this region mountainous seas and a heavy confused swell are experienced. Just outside the central region the strongest winds of the storm system are met, accompanied by violent squalls, and in this area, in well developed storms, it is possible that a wind speed of 150 knots in gusts may be attained. With increasing distance from the storm centre the wind generally decreases progressively. The aim of the seaman should therefore be to remain as far as possible from the centre of the storm system.

8. The track followed by the centre of the storm is known as the path of the storm, and the portion of the storm field on the right of the path is called the right semi-circle, and that on the left, the left semi-circle.

9. The semi-circle which lies on the side of the path towards the usual direction or recurvature, i.e., the right semi-circle in the northern hemisphere and the left semi-circle in the southern hemisphere, is known as the dangerous semi-circle. It is so called because a ship caught in it may be blown towards the path over which the centre will pass, or the storm may recurve and the centre pass over her.

10. The semi-circle which lies on the side of the path away from the usual direction of recurvature is known as the navigable semi-circle. A ship situated within this semi-circle will tend to be blown away from the path of the storm centre and the recurvature of the storm will increase her distance from the centre.

11. The indications of the approach of a tropical storm are:—

(*a*) A swell not caused by the wind then blowing.

(*b*) A fall in the barometer which may be divided into three phases:—

- (i) A slow fall during which the diurnal variation is still apparent, and which usually occurs from 500 to 120 miles from the centre of the storm.
- (ii) A distinct fall during which the diurnal variation is almost completely masked and which usually occurs from 120 to 50 miles from the centre.
- (iii) A rapid fall usually occurs from 60 to 10 miles from the centre.

(*c*) The reading of the barometer being 2 to 3 mb. below the normal for the time of the year is a probable indication of the formation of a tropical storm in the vicinity.

(*d*) An appreciable change in force and/or direction of the wind.

(*e*) The formation of convergent streaks or bands of cirrus cloud.

(*f*) An ugly threatening appearance of the sky, and lurid sky colourings at sunrise and sunset.

12. In order to judge the best way to act if there is reason to suppose a storm is in the vicinity, a seaman requires to know:—

(*a*) the bearing of the centre of the storm;

(*b*) the path of the centre;

(*c*) the semi-circle in which the ship is situated.

13. If an observer faces the wind, the centre of the storm will be from 12 to 8 points on his right-hand side in the northern hemisphere, and on his left in the southern hemisphere; 12 points at the beginning of a storm, gradually decreasing to 8 points towards the centre.

14. The path of the storm centre can be approximately determined by taking two such bearings with an interval of from two to three hours between observations, provided that there has been a wind shift during the interval and that allowance is made for the ship's movement. It can, however, be assumed that the storm is not travelling in a southerly direction, if in the northern hemisphere, or in a northerly direction if in the southern hemisphere; and if in a lower latitude than 15° its path is most unlikely to have an easterly component, except in the South Pacific eastward of the 180th meridian.

15. If the wind shifts to the right the vessel is in the right semi-circle, if to the left in the left semi-circle; if the wind is steady in direction but increasing in force, she is in the direct path of the storm.

16. A further check on the bearing and path of the storm may often be obtained by noting the direction from which the swell is coming and any change in this direction. The swell usually travels directly outwards from the storm centre.

17. If in the dangerous semi-circle, i.e., the right semi-circle in the northern hemisphere and the left semi-circle in the southern hemisphere, a steam vessel should steer to windward away from the assumed path of the storm, or stop and lie to if there is insufficient sea room.

A sailing vessel should heave to, on the starboard tack in the northern hemisphere and on the port tack in the southern hemisphere.

18. If the seaman has reason to believe that his vessel is in the direct path of the storm, or if in the navigable semi-circle (i.e., the left semi-circle in the northern hemisphere and the right semi-circle in the southern hemisphere), he should run with the wind on the starboard quarter in the northern hemisphere and on the port quarter

in the southern hemisphere, away from the assumed path of the storm until the barometer begins to rise.

19. Sometimes a tropical storm moves so slowly that a vessel, if ahead of it, can easily outpace it, and if astern of it, can overtake it. Since, however, she is unlikely to feel seriously the effects of a storm known to be in the vicinity so long as the barometer does not fall below 1005 millibars, it is recommended that frequent readings of the barometer should be made and that the vessel should continue on her course until the barometer falls to 1005 millibars or the wind increases to force 6. If and when either of these events occurs, she should act as described in the preceding paragraphs until the barometer has risen to 1005 millibars or the wind decreased to force 6 or less. Should it be certain, however, that the vessel is behind the storm, or in the navigable semi-circle, it will evidently be sufficient to alter course away from the centre.

20. If there is insufficient room to run when in the navigable semi-circle, a steam vessel should stop and lie to, and a sailing vessel should heave to on the port tack in the northern and on the starboard tack in the southern hemisphere.

21. If in harbour, or at anchor, a seaman should be just as careful in watching the signs and ascertaining the probable path of the storm centre, as he may be able to point his ship, or shift his berth with advantage.

22. In regions where tropical storms are encountered the local meteorological services issue special warning messages by radio during the storm season giving particulars of the position and probable path of any storm which is in the vicinity. Particulars of these messages are given in the Admiralty List of Radio Signals.

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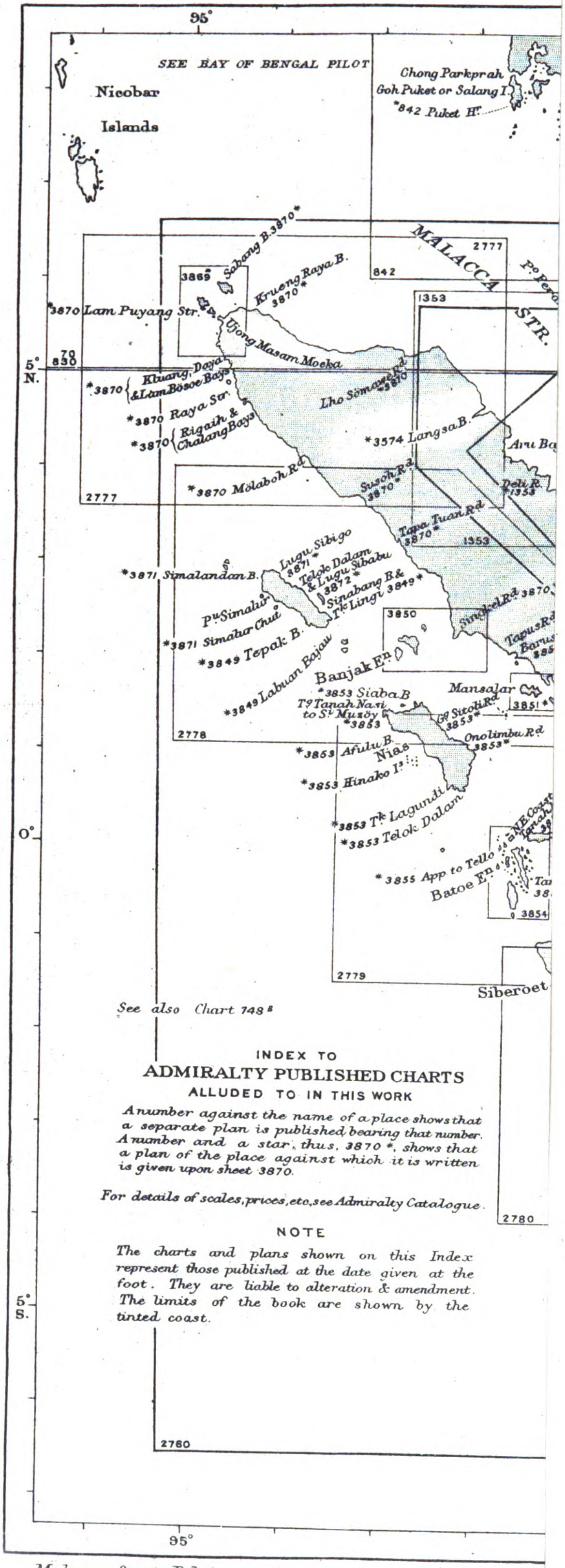


See also Chart 748ᴮ

INDEX TO ADMIRALTY PUBLISHED CHARTS ALLUDED TO IN THIS WORK

A number against the name of a place shows that a separate plan is published bearing that number. A number and a star, thus, 3870, shows that a plan of the place against which it is written is given upon sheet 3870.*

For details of scales, prices, etc, see Admiralty Catalogue.

NOTE

The charts and plans shown on this Index represent those published at the date given at the foot. They are liable to alteration & amendment. The limits of the book are shown by the tinted coast.

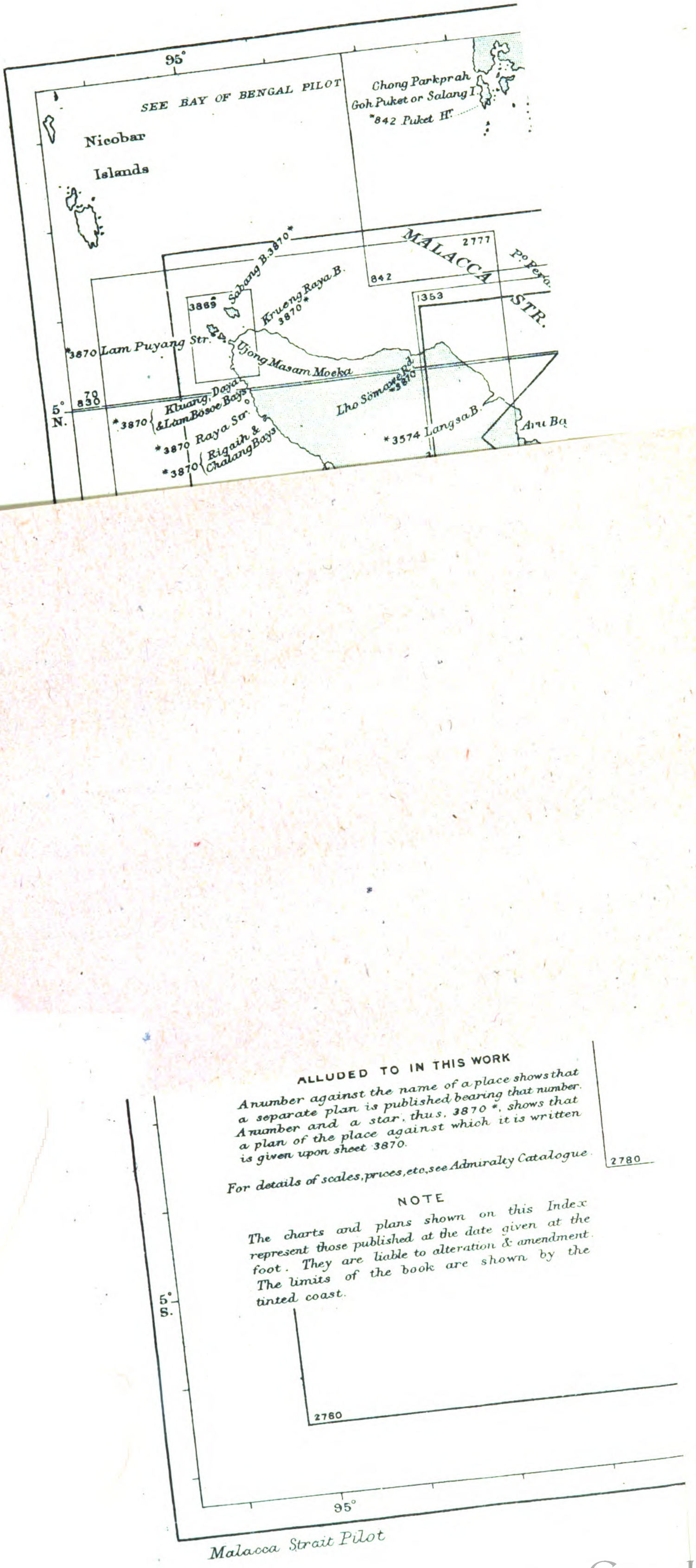
Malacca Strait Pilot

IMPORTANT.

Details of Lights, Fog Signals, and Time Signals (visual) are not included in this volume; for this information the Admiralty List of Lights, Parts VI and X, should be consulted.

Information regarding Vertical Movement of the Water is not included; for this the Admiralty Tide Tables should be consulted.

Details of W/T information (weather bulletins, storm and navigational warnings, time signals, fog signals, and D.F. stations) are not included; for this information the Admiralty List of Radio Signals should be consulted.



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Malacca Strait Pilot

MALACCA STRAIT PILOT

CHAPTER I

SUMATRA.—SIAM.—MALAY PENINSULA.—MALAY STATES.—STRAITS SETTLEMENTS. —CURRENTS. —TIDES. —TIDAL STREAMS. —SIGNALS.—FIRING DANGER AREAS.—PILOTS.—COMMUNICATIONS.—RADIO STATIONS.—FUEL.—REPAIRS.—STANDARD TIME.—DERATISATION.—NETHERLANDS EAST INDIES.—FISHING STAKES.—PASSAGES.—HEALTH.—METEOROLOGY.

Chart 748b.

SUMATRA.—Sumatra, with an area of 167,954 square miles, is the largest of the islands of the Malay archipelago, except Borneo, and is about three times the size of Java. The equator passes through about the middle of the island.

Sumatra was first visited by the Portuguese in 1508, in 1596 by the Dutch, and in 1685 the British established themselves at Benkoelen until 1824, when this territory was ceded to the Dutch in exchange for Malacca. Various rights that the British had in Achin were ceded to the Dutch in 1871. The island is now entirely under Dutch sovereignty.

There are eight residencies in the island, the principal one being Padang, the whole being under the Governor-General of the Netherlands East Indies, who resides at Batavia.

The population of the island at the census of 1930 was 7,677,826.

Physical features.—A lofty chain of mountains, known as the Barisan gebergte, extends throughout the whole length of the island, rising to numerous volcanic peaks, from 5,000 to over 12,000 feet ($1524^{m}0$ to over $3657^{m}6$) high, and consists in general of two or more chains, running parallel with each other, with a valley between, which is broken up by volcanic massifs, and in it lies a row of lakes, of which Toba is by far the largest. The volcanoes, of which some are still active, are mostly close to the west coast, the western slopes descending steeply towards the ocean and the eastern overlooking a vast alluvial tract of unusual uniformity.

This great alluvial plain, generally only a few feet above the level of the sea, is 600 miles long, and from 60 to 110 miles wide. The south-eastern extremity of the island is little better than a forest of mangrove growing out of a morass. A large part of the island is a sterile or intractable wilderness, and is very thinly populated.

Koerintji (Kurinchi) or Piek van Indrapoera, 12,484 feet ($3805^{m}1$) high, the culminating peak, smokes from time to time; Marapi (Merapi), 9,488 feet ($2891^{m}9$) high, about 90 miles north-westward of Koerintji, and the most active volcano, was in full eruption in 1807,

Chart 748b.

1822, 1834, 1845, 1863, 1864, and 1872, but has been quiet since 1877. Talang, 24 miles southward of Koerintji, has three craters, one filled with molten sulphur.

Rivers.—The water courses, owing to the configuration, are comparatively short on the western side, but those of the eastern slope are longer, navigable for small vessels, and in their lower courses, form considerable deltas.

The middle and lower courses of the large rivers, as the Asahan, Bila, Panai, Rokan, Siak, Kampar, Indragiri, Djambi and Palembang, all flowing eastward and south-eastward, are navigable by small craft with local knowledge over considerable distances. The last three are described in Eastern Archipelago Pilot, Vol. IV.

Minerals.—Gold is believed to have been worked in Sumatra and the island of Nias before the Christian era, long-neglected workings having been found by the Portuguese at the end of the fifteenth century. The principal gold-working mines are in the Residency of Benkoelen.

Coal is obtained principally from the Ombilin mines near Sawahloento, in the highlands of Padang ; there is coal also in the Residency of Benkoelen, and in the Malabub and Sinamu valleys ; lignite of good quality is found in several localities. Copper is said to be plentiful in the valley of the Paningahan, on the west coast. Iron is worked in the Lampong districts, and is also found at Tapanoeli and Benkoelen. Tin is not worked in Sumatra, though it is found on the west coast and at Siak. In addition, alum, naphtha, sulphur, and saltpetre abound near the volcanoes, and antimony, nickel, cobalt, zinc, quicksilver, bismuth, and arsenic are known to exist.

Flora and fauna.—In the northern part of the island the pine tree has advanced almost to the equator, and in the southern part are a variety of species characteristic of the Australian region. As a timber-producing country the island ranks high among the richly-wooded lands of the archipelago. The *Rofflesia Arnoldi,* the blossoms of which are sometimes 3 feet ($0^{m}9$) in diameter, and are the largest known, is found in Sumatra.

The coconut, betel, bamboo, and sugar-cane, and an abundance of tropical fruits, are indigenous.

Elephants are represented by a peculiar species. Tapirs, lemurs, and tigers are numerous. The rhinoceros is rarer and is a species peculiar to the island, having two horns ; it is found in the marshy jungles of the coast, and also at considerable altitudes.

Products.—Trade.—Buffaloes are the most important live stock ; the breed of horses is small but well made and hardy ; sheep also are small.

The staple industry is agriculture, which employs about 90 per cent. of the population. The principal cultivated plants are rubber, tobacco, tea, coffee, copra, rice, maize, sugar cane, areca palms, coconut palms, ground-nuts, and spices. The principal fruit trees are tamarind, pomegranate, guava, papaw, orange, and lemon.

In addition, cattle raising, fishing, navigation, and forestry employ a considerable number of the people.

The chief articles of export are pepper, petroleum, benzine, tobacco, rubber, hides, coffee, nutmegs, rattans, coral, rice, tapioca flour, camphor, gambier, gutta-percha, copra, and dried fish. Almost all the necessaries of life have to be imported, and the imports are chiefly wool, cotton, haberdashery, tea, provisions, wines, beer, spirits, tin-

Chart 748b.

ware, clothing, rice, metals, hardware, cutlery, matches, motor-cars, cement, drugs, &c.

Inhabitants.—The natives of Sumatra are of the Malayan stock, although the different tribes vary much in language, customs, and social conditions. The Malay language is generally understood and used to communicate between Europeans and natives, but there are many dialects, and in some cases, distinct languages, particularly on the west coast and its off-lying islands.

The majority of the natives are Muhammadans, but the religion is not strictly followed, and as a rule they are tolerant of other religionists; the centre of the island is occupied by pure pagans.

Ports.—The principal ports are Oeleë Lheuë (Ulee Lhöe) on the north coast, Belawan on the east, and Emma haven on the west.

Communication.—In the north and north-east of Sumatra, there is a narrow-gauge steam tramway which runs from Oeleë Lheuë to Langsa, and is known as the Achin Steam Tramway. On the east coast, the Deli railway runs from Tebing Tinggi to Pangkalan-Brandan, via Medan, and is connected to the Achin line.

On the west coast, Emma haven is connected with Padang by a railway, which is continued to the Ombilin coalfields, with a branch line to Fort de Kock and Pajahoemboeh. Priaman and Sungei Limau are also connected with Padang.

The towns and principal villages on the coast of Sumatra are connected to the general telegraph and telephone systems.

Currency.—The legal coins of 10, 5, 2½, 1 and ½ guilders of the Netherlands Indies are those of the Netherlands, but there are coins of 25, 10, 5, 2½, 1 and ½ cent pieces also used.

Weights and measures.—The metric system is generally in use, but the following are also used:—

1 Picul = 136·16 lbs. avoirdupois
1 Katti = 1·36 " "
1 Tjengkal = 4 yards
1 Square paal = 227 hectares ≐ 561·16 acres
1 Bouw = 1·7536 acres

Chart 842.

SIAM.—The Siamese monthon of Puket forms the northern portion of the eastern shore of Malacca strait. It has a coastline about 250 miles long between Burma and the northern boundary of the State of Perlis, with Goh Puket, in about lat. 8° N., or near the centre of its coast. The principal town is Puket, on Goh Puket. The principal industry of this monthon, or district, is the working of tin, which dwarfs all others.

Trang, Panga, Takuapa, and Renong on the mainland are small tin-exporting ports. Trang is the centre of an agricultural district in which there is both rubber and coconuts, and is the western terminus of the Siamese State railway. Much of its trade is in agricultural produce.

Little attention has been given to the possibilities of the Monthon of Puket other than tin-mining, though there is much land suitable for planting rubber, pepper, &c. There is much valuable timber in the monthon.

The principal export from the monthon is tin ore, about two-thirds of which is from Goh Puket.

The imports are rice and other provisions, iron and steel manufactures, cotton goods, &c.

Chart 842.

The health in the monthon is on the whole good. Goh Puket has been free from epidemic diseases in recent years. Puket is connected with Panga and Krabi by telephone and is connected to the general telegraph system of the Malay peninsula.

Chart 748b.

MALAY PENINSULA.—The Malay peninsula is a comparatively narrow strip of land lying between Malacca strait on the west and the China sea on the east, the Malay States being situated in the central and broadest part of the peninsula. Singapore is situated at the southern extremity of the peninsula. Penang and Province Wellesley, on the coast westward of Kedah, and Malacca between them and Singapore, forming portions of the Straits Settlements.

A range of mountains runs throughout almost the entire length of the peninsula, dividing the eastern from the western states; the heights of the various points of the range varies from 3,000 feet ($914^{m}4$) to over 7,000 feet ($2133^{m}6$). The highest point is Gunong Tahan, in Pahang, 7,184 feet ($2189^{m}7$); there are also Gunong Korbu (Kerbau), in Perak, 7,160 feet ($2182^{m}4$) high, and Gunong Yong Blar, on the boundary between Perak and Pahang, 7,152 feet ($2179^{m}9$) high. The whole of the peninsula from the mountain tops to the coasts is clothed with the most luxuriant tropical forests, consisting of a variety of grand trees, many of which are considerably over 100 feet ($30^{m}5$) in height.

The whole of the peninsula is well watered by innumerable streams, having their sources in the hills and combining to form rivers, which flow into the sea at regular intervals, some of which are navigable by vessels of shallow draught for more than 50 miles.

Minerals.—The most important mineral is cassiterite or tin ore; tungsten, wolfram, galena, copper, and gold are found, and monazite is widespread.

Flora and fauna.—The climate of Malaya, with its lack of pronounced dry seasons, permits the development of evergreen forest, which is the natural vegetation of the country. Primitive forest of this type covers more than half the total area of the peninsula, and contains more than 2,500 species of trees, the majority of which have no present commercial value. Of the larger timber-producing trees, a considerable portion belong to the family *Dipterocarpaceae*, which is almost entirely confined to the Malayan region.

The commonest hardwood trees of the country are merbau, chengal (called penak in Negri Sembilan), resak, damar laut kuning, and balau (especially near Singapore). Bintangor is a good wood for spars, and meranti is a light cheap wood, easily worked, and can be considered as the deal of the country.

There are relatively few flowering herbaceous plants in the lowland forest, the undergrowth of which consists chiefly of shrubs, young trees, ferns, palms and many woody climbers, including rattan canes. The mountain forest is richer in smaller flowering plants. On the trees, especially near streams, are many epiphytes, chiefly orchids and ferns. The principal fruit trees are the durian, mangosteen, custard-apple, pomegranate, jack fruit, coconut, areca nut, sugar-palm, and banana. Agila wood, camphor tree, and ebony are found in small quantities. There are 3,133,000 acres planted with rubber. Considerable progress has been made with the development of rice, pineapple and palm oil cultivation.

The natural coastal vegetation consists of mangrove in the tidal swamps; in sandy bays, chiefly on the eastern side of the peninsula, there is a fringe of forest of a special type, the dominant tree being usually the casuarina.

The fauna, dependent on the most luxuriant forest growth on the earth's surface, is probably the richest, or at any rate, the most varied, now existing. The mammals include anthropoid apes in the form of gibbons, many monkeys and the lemur. Noteworthy among the larger carnivores are the tiger, which is common in some districts, and the leopard, of which the black variety predominates. Other animals include the large wild ox, tapir, elephant, two species of rhinoceros, pigs and deer.

Hornbills are perhaps the most characteristic family of Malayan birds. Brightly plumaged trogons, bee-eaters, pittas, woodpeckers and sun-birds are common; pigeon and snipe abound.

Crocodiles are common and have been seen 30 miles from land in Malacca strait. Specimen of over 24 feet (7^m3) in length have been captured in the peninsula, where they probably kill more men than even the tiger. Only a few of the many Malayan snakes are poisonous, but these include the black cobra and the hamadryad which attain a length of over 14 feet (4^m3), and are reputed to attack human beings unprovoked. The true sea-snakes are all very poisonous and common in Malacca strait; they can be distinguished from innocuous water-snakes by having their tail flattened like an oar.

The Malay peninsula shows great variety in its insect life, having about 800 species of butterflies. Mosquitoes, including the malaria-carrying genus anopheles, are common. Centipedes, scorpions and spiders also occur, including some of the largest known forms.

MALAY STATES.—The Federated Malay States of Perak, Selangor, Negri Sembilan, and Pahang, which occupy a large portion of the Malay peninsula, are under British protection; of these, Pahang on the east coast, lies outside the limits of this volume.

In addition to the above, the Unfederated Malay States of Perlis, Kedah, Kelantan, Trengganu, and Johore are under British protection, the first two and Johore, only, being on the shores of Malacca strait.

In 1941, the estimated population of the Federated Malay States was 2,212,000.

The Anglican and Roman Catholic churches, and various denominations of the Methodist church, are all represented in the states. There are numerous vernacular schools, and English schools in the chief centres. Hospital accommodation is efficient in all districts.

Trade.—The principal exports are rubber, copra, tin, palm oil and pineapples; the chief imports are rice, sugar, piece-goods, machinery, petroleum, tobacco, iron and steel manufactures, drugs and motor-cars.

Harbours.—The principal ports in the Malay States in this volume are Port Weld and Telok Anson in Perak, Port Swettenham in Selangor, and Port Dickson in Negri Sembilan.

Communications.—The Federated Malay States Railway connects with all the principal ports and Singapore, and northwards to Bangkok.

The ports are connected to the general telegraph and telephone systems.

Currency.—Weights and measures.—These are the same as used in the Straits Settlements, *see* page 6.

Quarantine.—Pratique previously obtained in a port of the Straits

Chart 748b.

Settlements does not necessarily hold good in the harbours of the Federated Malay States.

All vessels arriving from infected or suspected ports should therefore fly the quarantine flag.

Chart 1355.

STRAITS SETTLEMENTS.—The Straits Settlements, a Crown colony which comprises Singapore, Penang (including Province Wellesley and the Dindings), and Malacca, were transferred from the control of the Indian Government to that of the Secretary of State for the Colonies on April 1st, 1867. The Cocos or Keeling islands were placed under the Straits Settlements in 1886 and Christmas island in 1889. Christmas island was annexed to the Settlement of Singapore in 1900, and the Cocos in 1903.

By a proclamation dated 30th October, 1906, the boundaries of the Colony were extended so as to include the Colony of Labuan (China Sea Pilot, Vol. II), with effect from January 1st, 1907.

In 1941, the estimated population of the Straits Settlements was 1,436,000, including 18,100 Europeans and 927,000 Chinese.

Trade.—**Shipping.**—The principal articles of export are rubber, tin, rice, copra, kerosene, preserved pineapples, benzine, dried fish, and palm oil. The chief imports consist of rice, rubber, tin ore, benzine, cotton piece goods, copra, kerosene, tobacco and cigarettes, petroleum, hardware, coal, condensed milk, motor vehicles, machinery, and electrical goods.

In 1938, vessels above 75 tons nett register aggregating 45,145,274 tons, entered and cleared the ports of the Straits Settlements.

Ports.—The principal ports of the Colony are Singapore, Penang, and Malacca.

Currency.—The principal coin in use is the dollar, equal to 2s. 4d., and with the half dollar and the British sovereign is legal tender for the payment of any amount. Subsidiary silver coins are 20, 10, and 5-cent pieces; nickel 5-cent pieces; copper one cent pieces. Government currency notes are also in circulation.

Weights and measures.—The principal commercial weights and measures are:—

1 chupak = 1 quart
1 gantang = 1 gallon
1 tahil = 1⅓ ozs.
1 kati = 16 tahils = 1⅓ lbs. avoirdupois
1 picul = 100 katis = 133⅓ lbs. avoirdupois
1 koyan = 40 piculs = 5333⅓ lbs. avoirdupois
1 kaki = 1 foot
2 hastas = 1 yard
2 elas = 1 depa = 1 fathom

Chart 793.

PERLIS.—Perlis, the northernmost of the Malay States, has an area of about 310 square miles, and a population, in 1932, of 48,970, including 3 Europeans. Rice, tin, rubber, and guano are exported. The capital is Kangar, about 5 miles up the Sungei Perlis.

The coastal plain, which is suitable for rice growing, extends inland for about 14 miles. Some isolated limestone hills rise abruptly from the plain. Padi cultivation is the main industry of the state; rubber and coconuts are also cultivated.

Chart 793.

The principal exports are padi, rice, rubber, tin ore, copra, and tapioca.

KEDAH.—The State of Kedah, on the western side of the Malay peninsula, has a coastline about 60 miles long, and an area of 3,640 square miles. Kedah is distinguished from the other Federated States by the great amount of its level ground, which affords considerable facilities for the production of wet grain; the highest peak is Gunong Bintnag, with an elevation of 6,103 feet ($1860^{m}2$), on the southern slope of which are Gunong Jerai or Kedah peak, 3,987 feet ($1215^{m}2$) high, and Bukit Perak, 2,823 feet ($860^{m}4$) high. Northward of Gunong Jerai is an extensive plain, bounded on the east by a chain of hills, 16 to 20 miles inland, but near the coast it is covered with a belt of mangroves from a half to one mile in breadth. The Kedah is the largest river; the Muda, a shallow rivulet, is the longest, but is only navigable by small vessels, and is joined at 30 miles above its mouth by Sungei Ketil.

Sungei Krian forms the boundary between Kedah and Perak, and Sungei Kedah, at the northern part, embraces, in its branches, a large district around Alor Star.

The capital is Alor Star, on the Sungei Kedah.

In 1938, the estimated population of Kedah was 481,200.

Products.—Trade.—The principal product in North Kedah is rice. There are large rubber, coconut and tapioca plantations in South Kedah, and there are tin and wolfram mines.

The principal exports are rubber, rice, tapioca, copra, and tin ore. The chief imports are cigarettes, motor spirit, sugar, kerosene, rice, condensed milk, and tobacco.

Communications.—An air-mail service is maintained between Europe, Alor Star, Singapore and Batavia.

Alor Star is connected by rail with the Siamese and Federated Malay State systems.

PENANG.—Pulau Penang, containing an area of 110 square miles, is the northernmost of the settlements, and situated off the west coast of the Malay peninsula, near the northern entrance to Malacca strait. It was founded in 1786, and officially known as Prince of Wales island; in 1805 it was made a separate Presidency under the East India Company; in 1826 it was incorporated under one government with Singapore and Malacca; and in 1836 the seat of government was transferred to Singapore.

The chief town is Georgetown, on Pulau Penang.

In 1941, the estimated population of Pulau Penang was 247,460.

Province Wellesley.—On the mainland, from which Pulau Penang is separated by a strait, 1½ miles wide, is Province Wellesley, a strip of territory forming part of the settlement; it extends about 35 miles in a north and south direction, including 10 miles of territory southward of Sungei Krian, the whole containing an area of 280 square miles.

In 1941, the estimated population of Province Wellesley was 171,600.

Products.—The soil is favourable to the growth of spices; the chief articles of cultivation are sugar, rice, rubber, and coconuts, and the island produces fine timber, which is well adapted for spars and shipbuilding; also various fruits. Province Wellesley is in a high state of cultivation when compared with the neighbouring territories; the chief articles cultivated are sugar, tapioca, padi, and coconuts.

Chart 793.

Communications.—The Province Wellesley section of the Federated Malay States railway connects Prai, in Province Wellesley, with the general system.

Dindings.—The Dindings, a group of islands, 80 miles southward of Penang, contain an area of 180 square miles, two-thirds of which is forest; they include Pulau Pangkor, the largest island, and a strip of territory on the mainland, about 70 miles from Georgetown, and about 22 miles long by 11 miles wide. They were included in Penang for administrative purposes, under a Resident Councillor, but, in 1934, the islands were retroceded to the State of Perak. The only product of any value is timber.

PERAK.—Perak is bounded on the north by Province Wellesley and by Kedah and Siam; on the east by Kelantan and Pahang; and on the south by Selangor. The area of the state is approximately about 7,740 square miles, and the greatest length, in a north and south direction, is about 170 miles, and the width, in an east and west direction, 100 miles.

In 1941, the estimated population of Perak, including the Dindings, was 992,700.

Port Weld is the port of Taiping, the capital; Telok Anson has also considerable trade.

The principal mineral product is tin. Rubber, coconuts and rice are cultivated.

Physical features.—Two mountain ranges trending from north-east to south-west are densely covered with jungle, and attain an elevation of over 7,000 feet (2133^{m}6), near the eastern boundary of the state; the valleys of the Perak and Kinta rivers lie between these ranges.

The state is well watered by numerous rivers and streams, of which the Perak river is the most important; it runs nearly north and south, then turns sharply westward and flows into Malacca strait. It is navigable as far as Telok Anson, about 30 miles from its mouth, by vessels drawing 16 feet (4^{m}9), and for another 135 miles by small craft, but the upper part of the river being rocky and abounding in rapids, is only available for small boats and rafts.

Chart 794.

SELANGOR.—Selangor, on the western coast of the Malay peninsula, is bounded on the north by Perak; on the south by Negri Sembilan; on the east by Pahang and Negri Sembilan; and on the west by Malacca strait; its total area is estimated at 3,160 square miles, its greatest breadth 48 miles, and it has a coastline of about 125 miles.

It was settled in 1718 under a Sultan, who, in 1783, was driven out by the Dutch; British political relations with Selangor commenced in 1818, and a British Resident was first appointed in 1874.

Where the state touches the centre range of the peninsula there are several peaks over 5,000 feet (1524^{m}0) high, and one, Gunong Liang, has an elevation of 6,336 feet (1931^{m}2); the state is drained by four rivers, the Bernam, the Selangor, the Klang, and the Langat.

Kuala Lumpur is the chief town of the state. It has many important and imposing buildings, is supplied with electric light, has an excellent water supply, and is the headquarters of the Government railway services.

Chart 794.

In 1941, the estimated population of the State of Selangor was 701,550.

Products.—Trade.—Rubber is the principal cultivated product in the state. Coconuts, rice, coffee, pepper, tobacco, and areca nuts are also grown, but in comparatively small quantities.

The principal exports are tin, rubber, coffee, and copra. The principal imports are rice, specie, railway material, cotton piece goods, and opium.

Port.—Port Swettenham is the port of Selangor as well as the principal port in the Federated Malay States.

Communications.—The Malay States Railway connects Taiping and the ports with the general system of the peninsula.

NEGRI SEMBILAN.—Negri Sembilan, or the Nine States, consists of Johol, Sungei Ujong, Ulu Muar, Jempul, Jelebu, Rembau, Terachi, Gunong Pasir and Inas; the area of the Confederation is about 2,560 square miles. The coastal district extends from Sungei Sepang on the north-west to Sungei Linggi on the south-east.

In 1941, the estimated population of Negri Sembilan was 296,000.

Port Dickson is the principal port of the state.

Trade.—The exports consist of tin and tin ore, rubber, copra, tapioca, and coffee, and the imports of rice, opium, tobacco, cotton, wool, iron ware, and specie.

Communications.—Port Dickson is connected by railway with Seremban, and thence with the general system of the peninsula.

MALACCA.—Situated on the western coast of the Malay peninsula, between Singapore and Penang, and about 110 miles north-westward of Singapore, Malacca consists of a strip of territory about 42 miles long, and from 8 to 25 miles wide, with an area of 659 square miles.

It is one of the oldest European settlements in the East, having been taken possession of by the Portuguese in 1511 and held by them till 1641, when the Dutch drove them out. In 1795 it was captured by the British, and retained by them till 1818, when it was restored to the Dutch; in 1824 it was exchanged for the British settlements in Sumatra, and became a British possession.

In 1941, the estimated population of the Settlement of Malacca was 236,100.

Products.—Tapioca plantations of large extent are very remunerative. Coconuts are largely grown along the coast; the soil is very suitable for rubber, and plantations of it are increasing. There are some tin mines of small extent worked by the Chinese.

Communications.—Malacca is connected to the general railway and telegraph systems of the peninsula.

Chart 795.

JOHORE.—The State of Johore occupies the whole of the southern extremity of the Malay peninsula, its western coast extending to Kuala Kesang in lat. 2° 06′ N.; it has an area of 7,320 square miles, Johore Bahru, on Johore strait, being the capital.

The Johore State railway connects Johore Bahru with the main line of the Federated Malay States railways.

Physical features.—The country is, as a whole, less mountainous than any other part of the peninsula; the hills are all detached groups or portions of two interrupted chains—Mount Ophir, near the western

Chart 795.

frontier, 4,182 feet ($1275^{m}7$) high, is the highest peak in the state, and Gunong Blumut, 60 miles east-south-eastward of Mount Ophir and 3,308 feet ($1008^{m}2$) high, is the summit of the principal mountain group.

Rivers.—The three largest rivers are the Muar, the Endau, and the Johore, flowing westward, southward, and eastward, respectively, of which the Muar, which rises in Negri Sembilan, is the largest. The Johore, rising near Gunong Blumut, opens out into a wide estuary opposite the eastern end of Singapore island.

Minerals.—Iron, the only mineral in which the state is really rich, is found almost everywhere ; a large iron ore mine is worked at Sri Medan, 12 miles up the Simpang Kiri river, Batu Pahat. Important deposits of tin have been found, and considerable tin mining is carried on ; gold is found in some localities.

Products.—Trade.—Rubber is the principal crop. European plantations are chiefly rubber and palm oil.

The principal exports are rubber, copra, pepper, areca nuts, tapioca, pineapples, tin, gambier, coffee and iron ore. Johore Bahru may be considered the chief port of Johore, but almost all the produce is shipped from Singapore, and Bandar Maharani, at the mouth of the Muar.

Chart 2403.

SINGAPORE ISLAND.—Singapore island, having an area of 220 square miles, is situated at the southern extremity of the Malay peninsula, from which it is separated by a strait about three-quarters of a mile wide. There are several islets adjacent to it, which form part of the settlement. The seat of Government is the town of Singapore, at the southern extremity of the island. The island, first occupied in 1819, was for many years administered by officials from India, and became a Crown colony in 1867. Owing to its geographical position and well-sheltered anchorages, it possesses a trade and importance out of all proportion to its area and productions.

The surface of the island is undulating and diversified by hills generally ranging from 70 feet ($21^{m}3$) to rather less than 400 feet ($121^{m}9$) high ; Bukit Timah, having the greatest elevation, is 667 feet ($203^{m}3$) high to the tops of the trees.

In 1941, the estimated population of Singapore island was 769,216.

Trade.—Shipping.—Singapore is a free port, and no duties are levied upon any articles except petroleum, opium, spirits, wines, and beer consumed in the Colony. For the nature of exports and imports, *see* page 6.

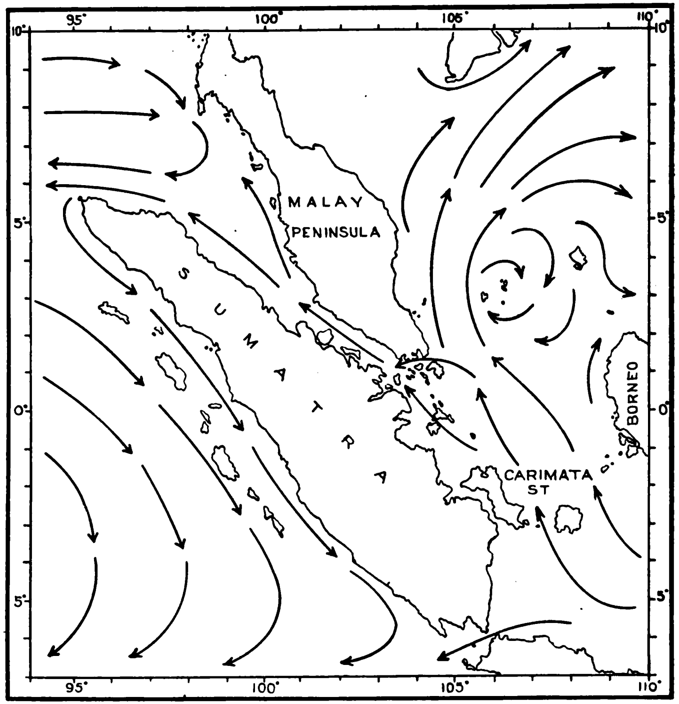
In 1939, a total of 12,930 merchant vessels (exclusive of vessels of 75 tons and under), net register, and native craft) of 31,647,614 tons, entered and cleared the port.

Communications.—A railway from Singapore runs for a distance of about 14 miles across the island to Woodlands, from which a causeway crosses Johore strait to Johore Bahru, connecting with the general system of the peninsula. There is a small lock at the northern end of the causeway, which can be used by small vessels.

CURRENTS.—The region covered by this volume includes Malacca strait, which allows a direct connection between the water of the Western North Pacific ocean and that of the Bay of Bengal, and also a part of the Indian ocean adjacent to the west coast of Sumatra and its off-lying islands.

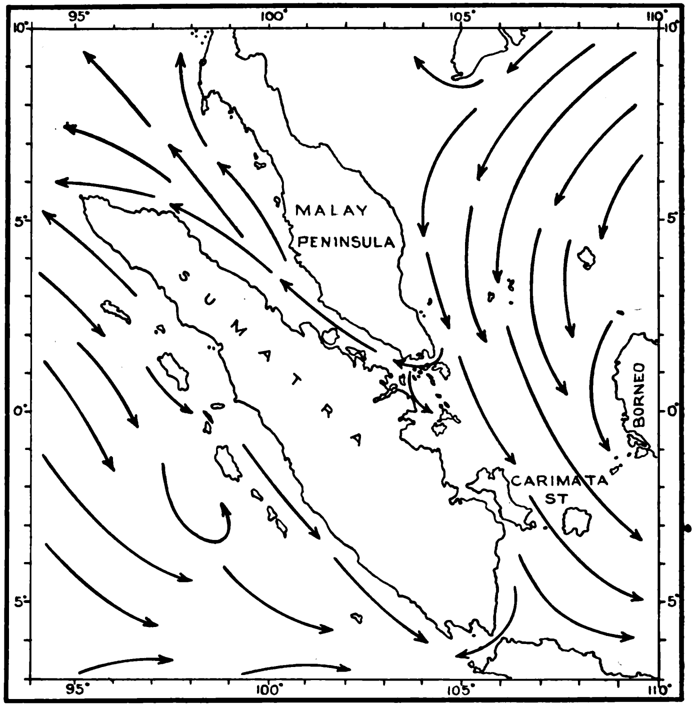
To face page 11.

Fig. 1.



July.

Fig. 2.



December.

General Current Circulation.

Chart 2403.

Malacca strait.—Throughout the year there is a flow of current in a general north-west direction through the central part of the Malacca strait. Tidal action is not appreciable beyond the distance of about 8 miles off the northern coast of Sumatra and about 40 miles off the north-east coast. During the North-east monsoon period, October to April, this flow is the result of a branch of the south-going monsoon current in the South China sea, which rounds the extremity of the Malay peninsula and so passes into the strait. During the South-west monsoon period, May to September, part of the water which flows westward in the Java sea and north-westward through the Carimata strait towards the South China sea passes directly into Malacca strait.

The water from the strait emerges into the Indian ocean, as a westerly flow along the north coast of Sumatra and through the Malacca and Bengal passages, throughout the year, with the possible exception of the transition month, April. During the North-east monsoon period, there is also a general emergence in a north-westerly direction into the Bay of Bengal, over the whole width of the entrance to the strait, between the north coast of Sumatra and Goh Puket. During the South-west monsoon period, the current in the eastern part of the Bay of Bengal flows eastward to the west coast of the Malay peninsula in June and July, and southward or south-eastward down that coast in August and September. In either case it recurves between about lats. 6° N. and 8° N., turning westward into, or parallel to, the west-going current emerging from Malacca strait along the north coast of Sumatra.

The above remarks refer to the resultant flow (*see* Figs. 1 and 2). While sets between north and west predominate in Malacca strait throughout the year, sets in every other direction are experienced, including those between south-east and south-west, in opposition to the main flow. The predominance of sets between north and west is greatest in December to February, and in this period, between about lats. 2° N. and 4° N., the number of such sets exceeds 75 per cent. of all currents observed; elsewhere in the strait the number exceeds 50 per cent.

The predominance of sets between north and west is least during June to August, the total number of such currents being then less than 50 per cent. of the total number of all currents observed, although they still exceed the number in any other single quadrant. Sets with an easterly component are especially frequent in the southern part of the strait in June and August.

Currents exceeding the rate of one knot, setting in various directions, may be experienced throughout the year in Malacca strait. When the currents between north and west are most constant, in December to February, about 17 per cent. of all currents observed exceed the rate of one knot, mainly in north-westerly directions. No current exceeding 2 knots has been observed. Throughout the year there is generally a north-westerly current of from one to 2 knots through Bengal passage.

Westward of the islands off the northern end of Sumatra, and between them and the Nicobars, currents in westerly directions markedly predominate in November to April, though all directions may be observed. A large proportion of these westerly currents exceed the rate of one knot and a small proportion have rates of from 2 to 3 knots. During the rest of the year currents in this region are more variable, but there is always a considerable proportion of currents

Chart 2403.

between west and south, setting in the teeth of the South-west monsoon, a number of which exceed the rate of one knot. The proportion of easterly currents is higher than in November to April and the rate of these occasionally exceeds 2 knots.

West coast of Sumatra.—Observations of current off this coast are scanty, and detailed information is therefore not available. The currents are usually weak and seldom exceed one knot. They are probably mainly influenced by the wind prevailing at the time, and the degree of variability is probably considerable or large.

The following remarks refer to the resultant flow of the general circulation. In the open ocean, outside the islands, south of lat. 2° N., there is a general south-easterly and southerly flow in April to November, turning south-westerly and westerly in various latitudes between 5° S. and 10° S. This is the east-going Equatorial counter-current of the Indian ocean recurving on the eastern side of that ocean into the west-going Equatorial current. In some months the south-easterly flow may be met from lat. 4° N. or 5° N.

Down the greater part of the west coast of Sumatra, between it and the islands, there is a general south-easterly flow throughout the year. In July and September this appears to be derived from the west-going flow along the north coast of Sumatra, rounding Achin head. In other months the south-easterly flow starts from farther south in about lat. 4° N. or sometimes lat. 2° N. When this is the case, the general set is between north-east and north-west up the northern part of the west coast. North of the equator, the current outside the islands may sometimes be in opposition to that flowing between the islands and the coast.

TIDES.—Throughout the eastern seas the rise and fall of the tide is largely affected by diurnal inequality.

Sumatra.—On the north and north-east coasts of Sumatra there is high and low water twice during the 24 hours, and the highest tides occur 2 days after full and new moon. Neaps occur the same time after quadrature.

On the west coast of Sumatra the rise and fall is small.

Singapore.—At Singapore and its neighbourhood the general feature of the tides consists of one high and one low water, succeeded by a second high and low water of considerably diminished range, the difference between the heights of this inferior high and low water being reduced sometimes to a few inches only; but the difference between two successive low waters is generally greater than the difference between two successive high waters. At certain of the moon's quadratures and in time of large lunar declination, this inferior tide may disappear altogether. At these times there will be only one high and one low water during the day. *See* Admiralty tide tables.

TIDAL STREAMS.—Off the north coast of Sumatra the flood stream sets eastward, and the ebb westward, rarely exceeding 2 knots at springs; at neaps they are sometimes imperceptible, except at the points or over banks and in narrow channels.

The streams are also affected by the constant current out of Malacca strait. For the greater part of the year the ebb stream is longer and stronger than the flood stream. During the North-east monsoon, there may be no easterly set for a day or more, conversely, the flood or easterly stream runs longer and stronger during the South-west monsoon.

See also remarks in the Admiralty Tide and Tidal Stream Tables for South-east Asia.

Off the west coast of Sumatra within 4 miles of the land there are weak tidal streams, setting north-westward and south-eastward.

SIGNALS.—Aircraft distress signals.—Any aircraft in grave or imminent danger, and requiring immediate assistance, will make or display one or more of the following signals :—

1.—The International distress signal S O S, by radiotelegraphy, as prescribed in the Admiralty List of Radio Signals.

2.—The spoken word " Mayday " by radiotelephony, as prescribed in the Admiralty List of Radio Signals.

3.—The International distress signal S O S, by visual signalling or any sound apparatus.

4.—The International Code flag signal NC.

5.—The International Code distance signal consisting of a square flag having above or below it a ball or anything resembling a ball.

6.—A continuous sounding of any sound apparatus.

7.—A succession of *red* pyrotechnic lights fired at short intervals or a *red* flare from which, at intervals of about three seconds, a *red* light is ejected.

Urgent signals from aircraft.—An aircraft, having an urgent message to communicate to a vessel concerning the safety of any aircraft, vessel or person, within range of assistance, will fly low around the vessel firing a succession of *green* pyrotechnic lights or will flash a succession of *green* flashes with the daylight signalling apparatus. The aircraft will then signal the message as prescribed in the International Code of Signals ; or alight alongside the vessel ; or, if unable to signal or alight, will fly towards the aircraft, vessel or person in distress. When the *green* pyrotechnic lights are seen from the vessel, a boat is to be prepared for lowering.

The signals from the aircraft are to be acknowledged from the vessel by flashing the answering sign, both by day or at night, with the daylight signalling apparatus ; if no such apparatus is carried, the answering pendant is to be hoisted close-up, by day, and, at night, a *white* light is to be waved in a position away from other sources of light.

If an aircraft is in difficulties which compel her to land, but is not in need of immediate assistance, she will fire a succession of *white* pyrotechnic lights, or, at night, if not in possession of pyrotechnic lights, she will make a succession of short flashes with her navigation lights.

Non-urgent signals from aircraft.—An aircraft wishing to communicate with a vessel on a matter of no urgency, will fly around the vessel to attract attention.

Signals to denote the presence of submarines.—The following warning signal is used to denote the presence of submarines :—

British vessels fly a rectangular red flag to denote that submarines, which may be submerged, are in the vicinity. Vessels are cautioned to steer so as to give a wide berth to any vessel flying such a flag. If from any cause it is necessary to approach her, vessels should proceed at slow speed until warning is given of the danger zone by flags, semaphore or megaphone, &c., a good look-out being kept meanwhile for submarines whose presence may be only indicated by their periscopes showing above water.

A submarine submerged at a depth too great to show her periscope may sometimes indicate her position by releasing a " smoke candle " which gives off a considerable volume of smoke on first reaching the surface.

Under certain circumstances warnings that submarines are exercising in specified areas may be broadcast by a General Post Office radio station.

It must not be inferred from the above that submarines exercise only when in company with escorting vessels.

Siamese submarines.—The caution regarding Siamese submarines, and the signal made by them, are the same as those for British submarines, except that Siamese vessels display a red *triangular* flag to denote that submarines are in the vicinity ; also, the warning that submarines are exercising is not broadcast by wireless.

Signals to be made by vessels inconvenienced by searchlights.—In the event of the navigation of a vessel being inconvenienced by the glare from searchlights near a port in the British Empire, she should make the International code signal ZO (— — • • — — —) by lamp and by whistle, siren or fog horn.

Both the light and sound signals should be employed, whenever possible, and should be repeated until the inconvenience is removed.

Only real urgency should necessitate the use of this signal as, unless the vessel is actually in the rays of a searchlight, it is not possible for the operators to know which projector is affected.

This signal is designed to assist mariners ; no liability whatever will be admitted.

This signal should also be used in similar circumstances near ports in other countries.

CAUTIONS.—Submarine cables.—The following articles are taken from the International Convention for the Protection of Submarine Telegraph Cables, of 14th March, 1884 :—

II. It is a punishable offence to break or injure a submarine cable, wilfully or by culpable negligence, in such manner as might interrupt or obstruct telegraphic communication, either wholly or partially, such punishment being without prejudice to any civil action for damages.

This provision does not apply to cases where those who break or injure a cable do so with the lawful object of saving their lives or their ship, after they have taken every necessary precaution to avoid so breaking or injuring the cable.

V. Vessels engaged in laying or repairing submarine cables shall conform to the regulations as to signals which have been, or may be, adopted by mutual agreement among the High Contracting Parties, with a view of preventing collisions at sea.

When a ship engaged in repairing a cable exhibits the said signals, other vessels which see them, or are able to see them, shall withdraw to or keep beyond a distance of one nautical mile at least from the ship in question, so as not to interfere with her operations.

Fishing gear and nets shall be kept at the same distance.

Nevertheless, fishing vessels which see, or are able to see, a telegraph-ship exhibiting the said signals, shall be allowed a period of twenty-four hours at most within which to obey the notice so given, during which time they shall not be interfered with in any way.

The operations of the telegraph-ships shall be completed as quickly as possible.

VI. Vessels which see, or are able to see, the buoys showing the position of a cable when the latter is being laid, is out of order, or is broken, shall keep beyond a distance of one-quarter of a nautical mile at least from the said buoys.

Fishing nets and gear shall be kept at the same distance.

VII. Owners of ships or vessels who can prove that they have sacrificed an anchor, a net, or other fishing gear in order to avoid injuring a submarine cable, shall receive compensation from the owner of the cable.

In order to establish a claim to such compensation, a statement, supported by the evidence of the crew, should, whenever possible, be drawn up immediately after the occurrence; and the master must, within twenty-four hours after his return to or next putting into port, make a declaration to the proper authorities.

The latter shall communicate the information to the Consular authorities of the country to which the owner of the cable belongs.

Single vessels approaching squadrons or aircraft carriers.—The attention of shipowners and mariners is called to the danger to all concerned which is caused by single vessels approaching a squadron of warships or merchant vessels in convoy so closely as to involve risk of collision or attempting to pass ahead of or through such a squadron or convoy.

Mariners are therefore warned that single vessels should adopt early measures to keep out of the way of a squadron or convoy.

The fact that it is the duty of a single vessel to keep out of the way of a squadron or convoy does not entitle vessels so sailing in company to proceed without regard to the movements of the single vessel. Vessels sailing in a squadron or convoy should accordingly keep a careful watch on the movements of any single vessel approaching the squadron or convoy and should be ready, in case the single vessel does not keep out of the way, to take such action as will best aid to avert collision.

Attention is also drawn to the uncertainty of the movements of aircraft carriers, which must usually turn into the wind when aircraft are taking off or landing.

FIRING DANGER AREAS.—Firing and bombing practices take place in a great number of areas off the coasts of Great Britain, Northern Ireland and Eire, and the number of areas in the waters of Commonwealth, Dominion, Colonial and Foreign Governments is increasing.

In view of the responsibility of range authorities for avoiding accidents, limits of practice areas will not be shown on charts and descriptions of areas will not appear in the Sailing Directions. Such range beacons, lights, marking buoys or targets as may be of assistance to the Mariner will, however, be shown on charts and, when appropriate, mentioned in the relevant volumes of Sailing Directions.

Lights will be mentioned in the Admiralty Lists of lights.

The principal types of practices carried out are:—

(*a*) *Bombing practice from aircraft.*

Warning signals are usually shown.

(*b*) *Air to air, and air to sea or ground firing.*

The former is carried out by aircraft at a large white or red sleeve or flag towed by another aircraft moving on a steady course. The latter is carried out from aircraft at towed or stationary targets on sea or land, the firing taking place to seaward in the case of those on land.

As a general rule, warning signals are shown when the targets are stationary, but not when towed targets are used.

(*c*) *Anti-aircraft firing.*

This may be from anti-aircraft guns or machine guns at a target towed by aircraft as in (*b*) above, or at balloons or kites. Practice may take place from shore batteries or ships.

Warning signals as a rule are shown from shore batteries but not from ships.

(*d*) *Firing from shore batteries or ships at sea at fixed or floating targets.*

Warning signals usually shown as in (*c*).

Warning signals, when given, usually consist of red flags by day and *red fixed* or *red flashing* lights at night. The absence of any such signal cannot, however, be accepted as evidence that a practice area does not exist. Warning signals are shown from shortly before practice commences until it ceases.

Aircraft are also sometimes used to warn shipping of their proximity to a danger area where practice is in progress. The method adopted, known as buzzing, consists of low flying by the aircraft with repeated opening and closing of the engine throttle.

Caution.—A vessel may be aware of the existence of a practice area from Local Notices to Mariners or similar method of promulgation and by observing the warning signals or the practice.

She should, whenever possible, avoid passing through an area in which a practice is in progress, but if compelled to do so should endeavour to clear it at the earliest possible moment.

If during anti-aircraft, air to air, sea or ground firing practice, projectiles or splinters are observed to be falling near a vessel, she should maintain her course and speed and all persons on board should take cover. Every practicable precaution, however, will be taken by the Authority in charge of the practice to avoid the risk of damage from falling shell splinters, bullets, etc., to vessels and all on board them within the area.

PILOTS.—Pilots are obtainable or at near the principal ports in the Straits Settlements. For vessels approaching Singapore strait from the Riouw (Rhio) archipel, *see* pilot station on Sambo, page 190.

Experience has shown that little confidence should be placed in the natives who offer themselves as pilots on the west coast of Sumatra for ports seldom visited.

COMMUNICATIONS.—There is frequent communication by steamer between the principal ports in Sumatra and Singapore, and thence with all parts of the world.

The ports of the Malay States have frequent communication with each other and with those of the Straits Settlements.

For further details *see* under the various ports.

Radio stations.—Radio stations open for public correspondence are established at the following places, details of which are given in the list published by the Bureau of the International Telecommunication Union :—Sabang, Medan, Penang and Singapore.

For details of radio stations which transmit weather bulletins, storm signals, navigational warnings, time signals, etc., *see* Admiralty List of Radio Signals.

FUEL.—Coal may be obtained at Emma haven, Penang, and Singapore.

Fuel oil may be obtained at Sabang, Penang, and Singapore.

REPAIRS.—Repairs to hull and machinery can be carried out at Penang, and Singapore.

There are 3 patent slips at Penang, and 5 dry docks and 5 patent slips at Singapore. The dimensions of the largest dock at Singapore are given in Appendix III.

STANDARD TIME.—The standard time maintained throughout the whole of the Malay peninsula is that of 110th meridian, or 7h. 20m. fast on Greenwich mean time. The time kept in the summer, however, is that of 7h. 30m. fast.

The standard time maintained in Northern Sumatra is that of the meridian of 97° 30′ E., or 6h. 30m. fast on Greenwich mean time. In Southern Sumatra, the time kept is that of the 105th meridian, or 7h. 00m. fast on Greenwich mean time.

DERATISATION.—In accordance with Article 28 of the International Sanitary Convention of 21st June, 1926, Deratisation can be carried out and Deratisation and Deratisation Exemption certificates can be issued to vessels at the following ports:—Sabang, Belawan, Penang, Sambo, and Singapore.

Deratisation certificates only can be issued at Sambo and Padang.

NETHERLANDS EAST INDIES.—Regulations for entering Zee-gats and harbours.—The following regulations have been made by the Netherlands Government:—

Manœuvres or other causes may necessitate the closing of the various zee-gats and harbours, or may make their entry subject to special reservations.

In normal cases the following signals will be shown from a flagstaff in the harbour area and/or from a lookout station, or may be shown from the light-vessels:—

Day signal.	*Night signal.*	*Meaning.*
A black cone, point upwards, between two black balls.	A *white* light between two *red* lights.	Entry prohibited.
A black ball below two black cones, points together.	A *white* light with a *green* light above it and a *red* light below it.	Entry and departure prohibited.
A black cone, point downwards, below two black cones, points together.	A *white* light between two *green* lights.	Departure prohibited.

All the above-mentioned shapes and lights are disposed vertically.

In exceptional circumstances, three red balls or three *red* lights, disposed vertically, denote that vessels are absolutely prohibited from entering, except in most urgent cases. When this signal is seen by a vessel approaching she must proceed, wind and sea permitting, to the examination vessel, which shows the same signal, stationed at the entrance to the zee-gat.

Permission or refusal to proceed will be given after examination. A vessel is then allowed to enter provided only she is in charge of a pilot or is preceded by a warship or pilot vessel; from the moment signals are shown all exemptions from the necessity of taking a pilot are cancelled. Captains and Masters of vessels are to carry out the instructions of the official who has come on board from the examination vessel and obey all signals.

If a warning shot is fired, where safety permits, the engines must immediately be stopped in the vicinity of the examination vessel. Failure to comply with these regulations may result in danger to the vessel and crew. As a general rule permission to enter by night will not be granted.

If a signal is made from the shore to intimate that vessels are subject to examination, and, if there is no examination vessel stationed in the zee-gat they must anchor or lie off.

The enforcement of such regulations at any particular zee-gat or harbour will not be announced beforehand.

Vessels coming from any port outside the Netherlands Indies are forbidden to communicate with the shore before obtaining permission from the commander of the guard-ship, or in case there is no guard-ship in the road, from the Harbour master.

Every vessel without a bill of health or with an unsatisfactory bill of health shall be subject to the regulations of quarantine. Every vessel from a foreign port is to be provided with a bill of health countersigned by the Dutch Consular officer at the port of departure.

Pilotage.—Pilotage is compulsory for all the ports of the Netherlands Indies, at which pilots are available.

The following are the signals for a pilot:

By day:—(1) The National flag, surrounded by a white border one-fifth the breadth of the flag displayed at the foremast head.
(2) Flags P.T. of the International Code of Signals.
(3) Flag G of the International Code of Signals.

By night:—(1) A *blue* light *every* 15 *minutes*.
(2) A bright *white* light flashed or shown just above the bulwarks at frequent intervals for one minute.
(3) The signal "PT" in the Morse code, made by flashing lamp.

The above signals must be shown until the pilot is on board or until an answering signal has been shown.

Vessels arriving at night, but not wishing to enter at night, shall show the pilot signal at daybreak.

Signals from pilot light-vessels.—The following signals are made from the pilot light-vessels in answer to vessels making the pilot signal:—

Signal.	*Signification.*
By day, no signal; by night, a *white* flare or swinging a *white* light.	The pilot will proceed to the vessel at once.
By day, flag "D" of the International Code of Signals, or a cone, point upwards, surmounted by a ball; at night, a *red* light above a *white* light.	No pilot available on board pilot light-vessel; vessel may enter without a pilot until one is met with.

Harbour signals.—The following signals are made from the harbour signal masts or the look-out stations in the Netherlands East Indies, and may be shown from the pilot light-vessels:—

Signal.	*Signification.*
By day, three red balls disposed vertically; by night, three *red* lights similarly disposed.	Entry absolutely prohibited.

Signal.	*Signification.*
By day, a cone, point upwards, between two balls, disposed vertically; by night, a *white* light between two *red* lights similarly disposed.	Entry prohibited.
By day, a ball surmounted by two cones, points together; by night, a *white* light with a *green* light above and a *red* light below it.	Entry and departure prohibited.
By day, a cone, point downwards, surmounted by two cones, points together; by night, a *white* light between two *green* lights, disposed vertically.	Departure prohibited.

General communication signals.—The following signals with flags of the International Code of Signals may be displayed *from the shore*:—

Signal.	*Meaning.*
Pendant No. 3 and A flag.*	Your berth is Pier I.
,, ,, ,, B ,, *	,, ,, ,, II.
,, ,, ,, C ,, *	,, ,, ,, III.
,, ,, ,, D ,, *	,, ,, ,, IV.
,, ,, ,, E ,, *	,, ,, ,, V.
,, ,, ,, F ,, *	,, ,, ,, VI.
,, ,, ,, G ,, *	,, ,, ,, VII.
,, ,, ,, I ,,	Time ball has not fallen at the exact moment.
,, ,, ,, K ,,	Time signal is out of order.
,, ,, ,, R ,, *	You must anchor in the road.
Blue flag.	No communication owing to bad weather.

*In the event of two or more vessels entering a harbour at the same time, the berthing or anchoring signal for one particular vessel will be indicated by displaying her Company (or National) flag below the signal.

The following signals with flags of the International Code of Signals may be displayed *on board*:—

Signal.	*Meaning.*
Pendant No. 1 and H flag.	I need dock assistance.
,, No. 2 ,, M ,,	Please send a motor boat.
,, No. 3 ,, J ,,	Require water.
,, No. 1 ,, N ,,	I have passengers from outside the Netherlands East Indies who wish to disembark.
,, No. 2 ,, V ,,	I require an ash-boat.
,, No. 3 ,, Q ,, At night a *red* light above a *white* light.	I have one or more suspected cases of infectious disease on board.

Flag B of the International Code of Signals (I am loading or unloading inflammable material or explosives) can also be used to denote "I am loading or unloading light inflammable material."

Vessels requiring the Company's doctor to attend on board should display their Company's flag above flag W of the International Code of Signals.

Tidal stream signals.—

Signal.	*Meaning.*
White flag.	Slack water.
Blue flag.	Ebb or out-going tide.
Red flag.	Flood tide.

Submarine vessels.—Caution.—Netherlands vessels, which are carrying out exercises with submarines or are escorting submerged submarines, display a red flag at the masthead.

All vessels must give a wide berth to a vessel displaying this red flag.

A vessel which, for some reason or other, finds it necessary to approach the vessel displaying the red flag, must proceed at slow speed until the latter vessel has indicated the dangerous area by means of flags or other signals, or by megaphone.

In all cases, under these circumstances, a sharp lookout must be kept for submarines which may have only the periscope above water.

Buoyage.—The following is the uniform system of buoyage in the Netherlands East Indies :—

The term starboard hand means that side which would be on the right-hand going with the main stream of flood, or in entering a harbour, river, or estuary, from seaward ; the term port hand means the left-hand side, under the same circumstances.

Conical buoys are starboard-hand buoys as thus defined, and are painted white.

Can (truncated) buoys are port-hand buoys as thus defined, and are painted black.

Spherical buoys mark the ends of middle grounds, or the separation of two channels, and are painted black and red in horizontal bands except when they lie between buoys of the same shape and colour, they are then painted conformably to these. Spherical buoys are always surmounted by topmarks, other buoys only in special cases.

Direction buoys, lying outside and marking the approach to seaward channels, termed " verkenningstonnen " have no special character assigned to them.

Wrecks are marked by green conical or can buoys, according as the wreck lies on the starboard or port side of the fairway. Should the wreck be in mid-channel, it will be marked by a can buoy on one side, and a conical buoy on the other side, which buoys are to be treated as port or starboard-hand buoys according to shape.

Topmarks are as follows :—

A diamond marks the outer or seaward end of a bank.
A cone marks the inner end of a bank.
A ball marks the starboard side of the fairway.
A truncated cone marks the port side of the fairway.
A cross is used as a special mark, and surmounting a spherica buoy indicates that the buoy may be passed on either side.
The ball and truncated cone are also used as topmarks for beacons.
The topmarks are of the same colour as the buoys or beacons on which they are placed.

The buoys of sea channels are numbered consecutively (beginning from seaward), and marked by the first letter of the name of the channel. The numbers and letters are white.

At some places small buoys, wood beacons, projecting marks, &c., which are not official, are found. These do not necessarily conform to the buoyage system.

FISHING STAKES.—On most of the banks fronting the shores of Malacca strait, and probably off many parts of the coasts mentioned in this volume, particularly off the mouths of rivers, fishing stakes and enclosures will be met with in depths of from 3 to 5 fathoms (5^m5 to 9^m1), and in some cases in greater depths.

These enclosures, known as *seros* and *jermals*, are constructed of trees firmly driven into the banks, and interlaced with branches, &c., and form a considerable danger to vessels navigating at night near the depths mentioned. They last many years, and to those with local knowledge are good landmarks for making the river mouths, especially on the east coast of Sumatra, where there are but few conspicuous objects.

Chart 1355.

PASSAGES.—Vessels from Colombo, or places southward, bound through Malacca strait, should make the north-western extremity of Breuëh (Bröeh), being careful to avoid North-west rock, thence passing through Bengal and Malacca passages into Malacca strait. Vessels from Calcutta, Rangoon or other ports northward of Madras should steer as direct as possible to pass at least 10 miles north-eastward of Djemoer (Jemur) of the Aroeah (Aroa) eilanden, and about 3 miles south-westward of One-fathom bank lighthouse thence north-eastward of South sands and Pyramid shoal, thence as directed for Singapore strait on pages 194 and 219.

Chart 2760.

West coast of Sumatra.—The routes along the west coast of Sumatra may be considered as three in number, but the Outer route only may be said to be free from danger. Vessels should keep in the open sea until abreast the desired port before hauling in.

The route westward of all the islands, in the open sea, is the best of the three, more especially for sailing vessels and others not intending to touch at any of the west coast ports. South-westerly and southerly winds often prevail here, when north-west squalls, variable baffling winds, calms, and southerly currents, may be experienced close to the land. A quicker voyage northward will thus be made during either monsoon. If touching at any of the ports, they may be steered for through the passage nearest to their parallel.

The Middle route is the space between the chain of large islands, in the offing, and those small islands adjacent to, and interspersed along the coast, and ranges from 10 to 30 miles from the coast. It is frequently taken by the coastal mail steamers running between Batavia and the north coast of Sumatra *via* the coast ports.

The Inner route is that close along the coast, and between some of the islands and dangers off it. Vessels visiting many of the ports are obliged to use it, but considerable risk is run when taking this route at night ; those using it are generally obliged to anchor at sunset.

HEALTH.—The effect of the heat and high humidity on one's health is cumulative, so that after a few years a change to a bracing climate becomes necessary if health is to be maintained. Such a change is sometimes available in the high level districts which, owing to their lower temperature, may be relatively cool and stimulating compared with the oppressiveness of the plains. The rate of fall of temperature in the vertical is everywhere about 1° per 300 feet (91^m4). The climate generally in the Malay peninsula, although enervating, is not actually unhealthy and there are no special diseases.

In Sabang baai, Pulau Wé, epidemics are unknown, and the island is very healthy. It is favourably influenced by the monsoons.

In the vicinity of Deli the health of the country may be considered good, though unseasonable weather often brings epidemics of fever and beri-beri, especially among new-comers. Isolated cases of cholera occur. The mornings are fresh and cool.

At the Karimoen eilanden, the climate, except in the swamps, is not unhealthy. The town of Benkoelen is said to be unhealthy.

METEOROLOGY.—Weather.—General conditions over the region.—The area covered by this volume has a typical equatorial climate, hot and humid throughout the year. Mean temperature is within a few degrees of 80° with little change from month to month. The total range of temperature is small; temperature rarely reaches 100° or falls below 65° at sea level. Rainfall is heavy on the coasts. There is no dry season but in most areas February and June to August are the driest months. Much of the rain falls in heavy downpours of short duration.

The northern part of the area is reached by the North-east monsoon of the China sea from December to March, and by the South-west monsoon from June to September. The extreme south is reached by the North-west monsoon of the Java sea from about December to February and by the South-east trade wind of the South Indian ocean from April to October. The monsoons are not very steady in this area, and winds are usually light. Squalls, however, are rather frequent; during these, winds may reach force 5 or 6 and occasionally force 7 for short periods. Tropical revolving storms do not occur.

Visibility is usually good except during heavy rain. Haze occurs at times, chiefly in the south during September and October.

Pressure and winds.—The distribution of average pressure in January and July is shown in Figs. 1 and 2. The average pressure distribution over the region undergoes a seasonal change. From December to February average pressure increases from the equator northwards and decreases south-eastwards, towards Australia. From May to October it increases from the equator southwards and decreases north-westwards. The average gradient is very slight in all seasons. In March, April and November average pressure is about 1,010 mb. over the whole region.

Pressure changes from day to day and from month to month are small. The largest change is the diurnal variation. Pressure is normally highest about 1000 and 2200 local time and lowest about 0400 and 1600; the daily range is approximately 3 mb. The following table gives for each hour the correction to be applied to the observed pressure to bring it to the mean of the day.

Local Time	0	1	2	3	4	5	6	7	8	9	10	11
	mb.											
10° N. – 0°												
May–Oct. . .	−0·7	−0·2	+0·2	+0·6	+0·7	+0·5	+0·1	−0·4	−0·9	−1·2	−1·3	−1·0
Nov.–Apr. . .	−0·6	−0·1	+0·5	+0·8	+0·9	+0·7	+0·2	−0·4	−1·0	−1·4	−1·5	−1·2
0° – 10° S.												
Year . . .	−0·7	−0·2	+0·2	+0·6	+0·7	+0·5	+0·1	−0·5	−1·0	−1·3	−1·3	−1·1

Local Time	12	13	14	15	16	17	18	19	20	21	22	23
	mb.											
10° N. – 0°												
May–Oct. . .	−0·5	+0·2	+0·8	+1·3	+1·5	+1·4	+1·0	+0·4	−0·2	−0·7	−1·0	−0·9
Nov.–Apr. . .	−0·7	+0·1	+0·8	+1·4	+1·6	+1·5	+1·0	+0·4	−0·3	−0·8	−1·0	−1·0
0° – 10° S.												
Year . . .	−0·5	+0·2	+0·9	+1·4	+1·6	+1·5	+1·1	+0·5	−0·1	−0·7	−0·9	−0·9

To face page 22.

Fig. 1.

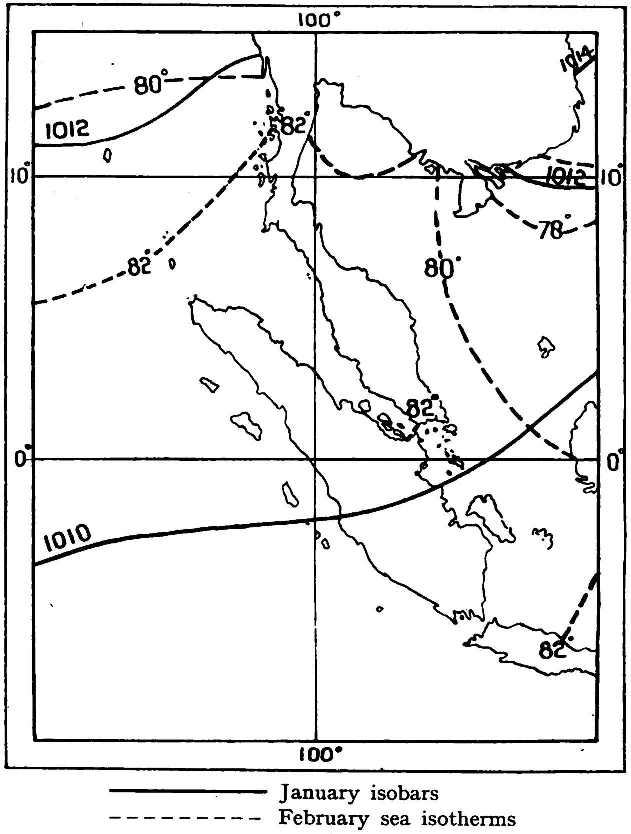
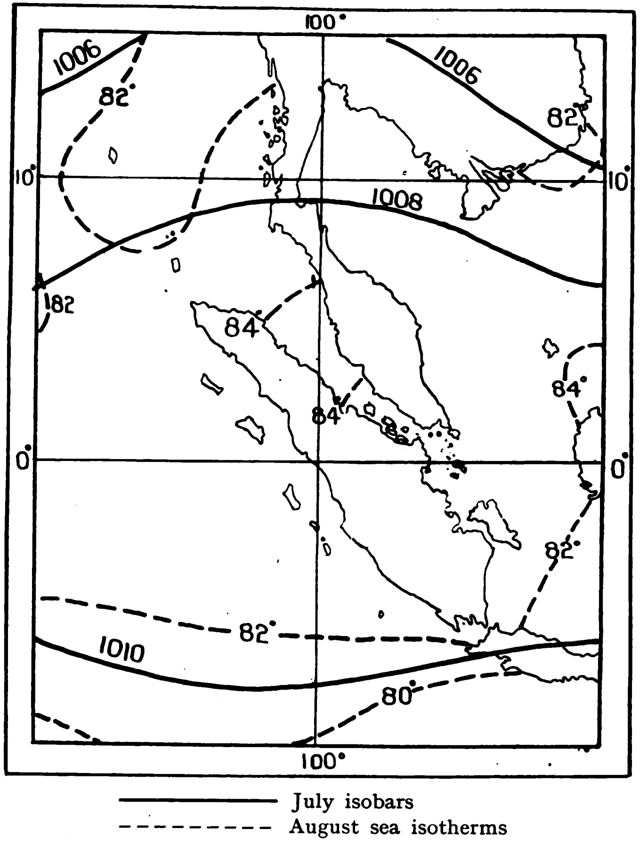
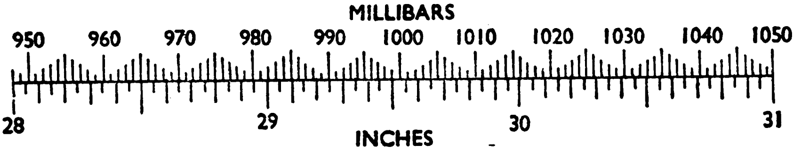


Fig. 2.



The following diagram gives the equivalent in millibars of inches of mercury and vice-versa :—



Figs. 3 to 6 show the predominant winds in January, April, July and November. Corresponding with the seasonal change in the average pressure distribution there is a change in the predominant wind direction. From about the middle of November until the middle of March northerly winds predominate—the North-east and North-west monsoons. From late May to September predominant winds are southerly—the South-west monsoon and the South-east trade wind. April and early May, October and early November are intermonsoon months, when in most areas there is no predominant wind direction. The monsoons do not, however, begin and end at the same time over the whole area ; in any particular locality the time of beginning and ending may vary somewhat from year to year.

North-east monsoon.—The North-east monsoon of the China sea reaches the northern part of the area, but it does not attain the same strength or steadiness as in the China sea. It begins during November and reaches its maximum strength and steadiness in January (*see* Fig. 3). It ceases in the latter part of March. It is usually light but it sometimes blows moderate to fresh for a few days at a time in the northern part of the area and may reach force 6 for short periods. In January its average strength is force 2-3 off the north coast of Achin and in the extreme north of Malacca strait, also near Singapore ; elsewhere it is lighter. Near Ujong Masam Moeka and Singapore about 10 per cent. of observed winds exceed force 4 during December and January. The monsoon is very weak and unsteady off the west coast of Sumatra especially near the equator where winds are mainly light northerly and westerly.

North-west monsoon.—The North-east monsoon crosses the equator and is deflected to directions between north-west and west south of the equator, becoming the North-west or "Westerly" monsoon of the Java sea. This monsoon blows off south-western and southern Sumatra from December to March. It is, however, weak and unsteady ; it appears to be steadiest in December.

South-west monsoon.—Off northern Sumatra and in the northern half of Malacca strait the South-west monsoon blows from May to September. It is steadiest and strongest in July and August, when off northern Achin and in the northern part of Malacca strait its average strength is force 2–3 and from about 10 to 20 per cent. of observed winds exceed force 4. Though the monsoon is usually light there are frequent periods of stronger winds accompanied by squalls and heavy rain ; the wind may occasionally reach gale force in the squalls. There is usually a swell off the west coast of Sumatra at this season.

South-east trade wind.—From about May to October or November the South-east trade wind of the South Indian ocean extends northward and reaches southern Sumatra where it is known as the South-east monsoon.

Land and sea breezes.—Along many of the actual coasts the monsoons are weak and the predominant winds are the land and sea breezes. These breezes are caused by the unequal heating and cooling by radiation of the land and sea. During the day when the land is warmer than the sea a sea breeze usually blows on shore. It generally rises gradually during the forenoon but sometimes not until after mid-day, the forenoon being calm; it reaches its maximum strength in the afternoon and dies away around sunset. At night, when the land is cooler than the sea, there is usually an offshore land breeze. The land breeze may spring up about two hours after sunset, but sometimes the nights are calm, and the land breeze is not felt until the early morning. The conditions favourable to the strongest land and sea breezes are bright, sunny days and clear nights with a weak monsoon. Except where the land slopes steeply to the coast, the sea breeze is usually stronger than the land breeze. The effect of the sea (or land) breeze may be to deflect the prevailing monsoon, to strengthen it, to neutralize it or, if very weak, to reverse it.

Land and sea breezes are much influenced by topography and vary considerably along the coasts; it is therefore necessary to study each part of the coast to forecast the development of these breezes accurately.

The effect of the land and sea breezes is not usually felt more than 20 miles from the coast and often it does not extend beyond 10 miles. In favourable circumstances, however, the sea breeze may be felt 40 miles or more from the coast, except in Malacca strait south-eastward of Diamond point.

Squalls including " Sumatras."—Squalls accompanied by heavy rain and sometimes by thunder are common in the intermonsoon months also during the South-west monsoon north of the equator and the North-west monsoon south of the equator. The squalls approach from a westerly point. There is usually a slight shift of wind direction; the strongest winds are said to blow from north-west.

Thundery squalls of a line-squall type, known as " Sumatras," occur in Malacca strait from April to November. They rise suddenly and approach from a westerly point. They are accompanied by very heavy rain and an arch of heavy cumulonimbus cloud which spreads quickly over the sky. The cloud gives a brief warning of the onset of the squall which usually bursts when the cloud is nearly overhead. As the wind freshens it shifts suddenly, veering from southerly to a point between south-west and north-west. The wind usually reaches force 5 or 6 and may reach force 7 or 8 for brief periods, with gusts up to 40 knots and occasionally 50 knots. These squalls usually occur on the coast of Sumatra between 2200 and 0200 and move across the strait; they often occur along a line about 200 miles in length running north-west to south-east and moving north-eastward. The squalls last from about one to 4 hours, penetrating but little inland. As a rule those beginning at an earlier hour are the more intense and of shorter duration. The squalls occur chiefly between Malacca and Singapore where in any particular part of the strait there are from about 6 to 8 a month in July and August and 3 or 4 in each of the other months between May and September. They are rare northward of Krian.

Waterspouts are rather common in Malacca strait.

Gales.—Gales are infrequent. Force 7 or above is not recorded in more than one per cent. of ships' observations, except in the north from June to September. In July, the worst month, the frequency reaches about 3 or 4 per cent. off the extreme north of Sumatra (*see* Fig. 5). The gales occur during squalls and are usually local and of short duration; they blow from directions between south-west and north-west.

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Fig. 3.

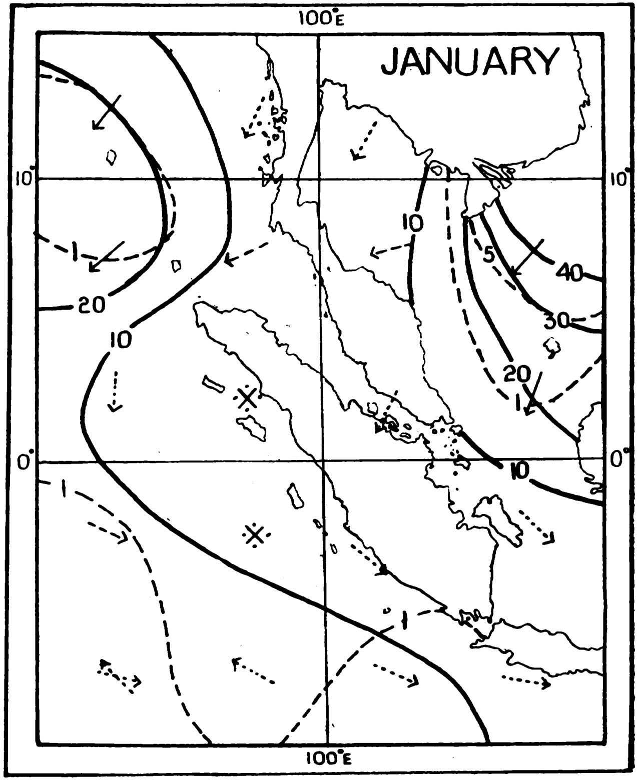

Fig. 4.

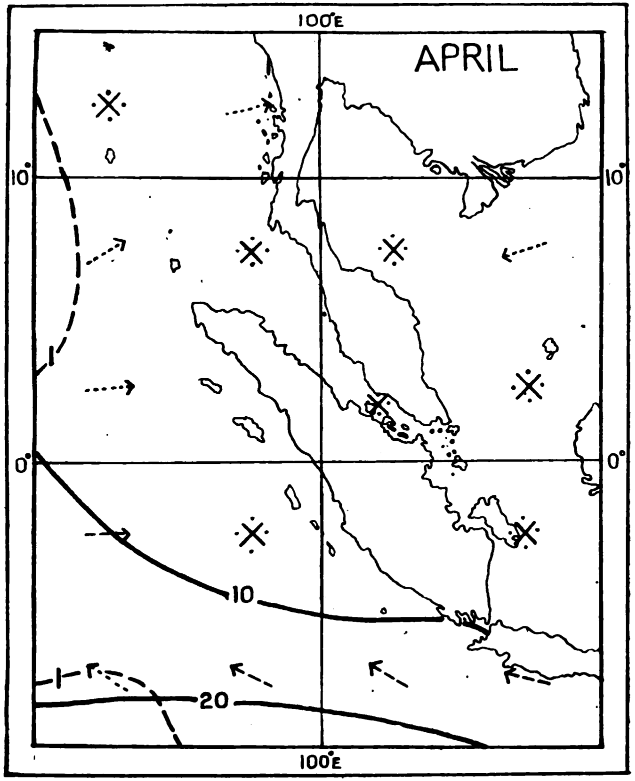

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Fig. 5.

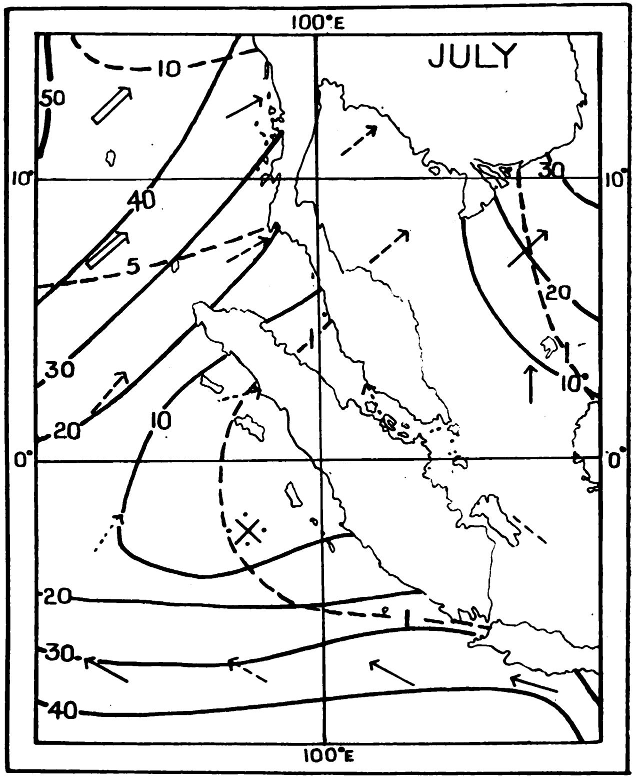
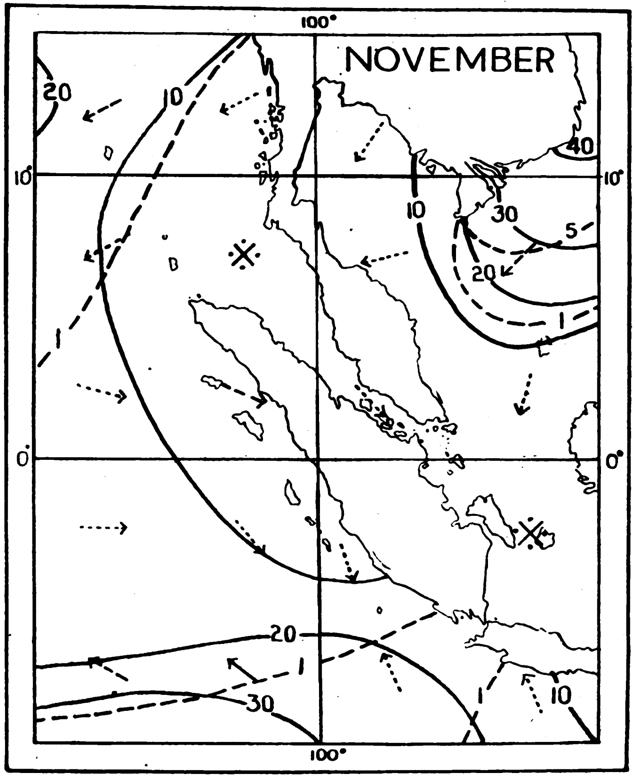


Fig. 6.



Cyclonic disturbances.—Tropical revolving storms do not reach the area covered by this volume.

Sea temperature.—The average temperature of the surface of the sea is about 82° from September to March over most of the area. In April and May it is about 84° ; from June to August it is between 82° and 84°, reaching 84° in Malacca strait. Isotherms of average sea temperature for February and August are shown in Figs. 1 and 2. The range of temperature to be expected in any particular month is from about 4° to 6°.

Fog and visibility.—Fog does not occur at sea, but fog or mist is not infrequent at night or in the early morning over river estuaries and wet, marshy ground. It usually disperses an hour or two after sunrise.

Visibility is sometimes reduced by haze during fine weather, especially in the southern part of the area. The sky loses its clear blue colour and assumes a hazy white tint and the outlines of the mountains become indistinct ; at night stars of less than the third magnitude are faint or invisible. The haze is probably partly heat haze of convectional origin but is also largely due to dust. Visibility may be reduced to a few hundred yards in heavy rain squalls ; it is usually best in the intervals between rain in wet weather.

Note.—For meteorological charts of this region *see* London, Air Ministry, Meteorological Office, " Monthly meteorological charts of the Indian Ocean " (M.O.M. 470).

LOCAL WEATHER.—I. Sumatra, North coast from Ujong Masam Moeka to Diamond point and off-lying islands.—Winds. —The North-east monsoon sets in towards the end of November. It blows from between north-east and east becoming mainly easterly near the coast of the mainland. It is usually light, but occasionally blows fresh for a day or two ; off the extreme north of Achin about 8 per cent. of observed winds exceed force 4 in December and January. Land and sea breezes blow regularly on the coast between Krueng Raja and Diamond point ; aided by the monsoon the sea breeze is likely to be moderate to fresh for a few hours in the afternoon ; the land breeze sets in an hour or two after sunset. At Oeleë Lheuë the monsoon usually predominates, but land and sea breezes are felt occasionally. At Pulau Breuëh the monsoon predominates ; at Sabang, land breezes are felt at night. Eastward of Ujong Masam Moeka there is usually a slight surf of about 3 feet (0$^{\mathrm{m}}$9) in height from December to February, rather less at night and sometimes a little more during the afternoon. During fresh or strong monsoon communication with the shore may sometimes be impracticable; December and January are the worst months.

Towards the end of March and in April winds are variable, both easterlies and westerlies are experienced. Land and sea breezes are well developed.

The South-west monsoon sets in during the latter part of April or early May and lasts until October. It is steadiest from June to September when off the coast from about 10 to 20 per cent. of observed winds exceed force 4. Strong squalls (*see* page 24) approach at times from the sea by day as well as at night. During these the wind may reach force 6 and occasionally force 7. Land and sea breezes blow regularly along the coast between Krueng Raja baai and Diamond point which is sheltered from the monsoon ; this is the best season for landing on this coast. Strong south-westerly winds sometimes reach Sigli from the high land. Between Oeleë Lheuë and Krueng Raja baai land and sea breezes are irregular; at Pulau Breuëh and Sabang the monsoon usually blows day and night. Near Ujong Masam Moeka heavy southerly offshore gusts are experienced. Between Ujong Masam Moeka and Krueng Raja baai there is probably a surf of 3 feet (0^{m}9) or more on most days from June to September. Between Ujong Masam Moeka and Pedro punt the South-west monsoon at times throws a high sea on to the coast; a squall sometimes comes from north-west, rendering it a lee shore, and the waves will break in a depth of about 3 fathoms (5^{m}5).

Temperature and humidity.—It is probable that the mean temperature is about 80° during most of the year, with day maxima on the coast averaging about 85° and night minima about 75°. The months November to February are probably slightly cooler.

Relative humidity is high and probably not very different from that at Medan (*see* table on page 35).

See also remarks on the combined effects of high temperature and humidity on page 30.

Cloud.—At sea, the average cloudiness is from about 5 to 6 tenths from December to June and from 6 to 7 tenths from July to November. On the eastern part of the coast the cloud amount may be a little higher than at sea during the North-east monsoon.

Rain.—The rainfall is rather heavy, the yearly totals averaging from 60 to 65 inches on the coast of the mainland and 85 inches on the eastern side of Sabang. There is a good deal of variation from year to year. The wettest months are November to January and there is another wet period in April or May. February or March and June to August are the driest months. The table below gives (*a*) the average number of rain days (0·04 inches or more) per month and (*b*) the estimated number of days with considerable rain (0·4 inches or more) in the wet and drier periods.

	Nov.-Jan.		*Mar.,*	*June-Aug.*
	(*a*)	(*b*)	(*a*)	(*b*)
Sabang . . .	16–18	7–10	8*–10	2*–3
Koeta Radja . .	10–14	4–6	8–9	2–3
Sigli	13–16	6–9	5–10*	1–3
Lho Seumawe . .	10–14	6–8	5–7	1–3

*April.

During the greater part of the year much of the rain probably falls in heavy downpours; but from October to January there may be periods of continuous rain. During periods of stronger monsoon one or 2 days of rain may occur on the coast.

Fog and visibility.—*See* page 25. At sea, mist or haze (reducing visibility to 5 miles or less) is recorded in from 5 to 10 per cent. of ships' observations from February to April and from September to November. It is less prevalent in the other months.

II. Sumatra, east coast.—Diamond point to Mendol island, including off-lying islands.—Winds.—The North-east monsoon is never very steady but is most constant in January when from 21 to 40 per cent. of winds are north-easterly (*see* Fig. 3). In November and December north-westerly winds are the most frequent; in February the most frequent winds are north-west and north-east. Northward of Medan, during periods of stronger monsoon, winds may be fresh, especially in the afternoon when communication with the shore may be difficult.

The South-west monsoon begins in late May or early June; from June to September winds in the strait are mainly south-easterly but are not steady. Squalls known as "Sumatras" (*see* page 24) occur off the coast at this season. They are most frequent between 2200 and 0200.

On the coast, land and sea breezes are well developed in the north. At Belawan the sea breeze sets in during the forenoon and reaches its maximum speed of about 10 knots from 1600 to 1700. It blows from between north and north-east during the North-east monsoon and is easterly during the South-west monsoon. The land breeze rises between approximately 2000 and 2200; it blows from between south and west during both monsoons. It lasts until about 0800 or 0900. At Medan, winds about 0700 are mainly west and north-west from October to March, and between south-east and west from April to September. From November to January about 30 per cent. of these morning winds exceed force 3. At Tanjong Tiram the day wind is north-north-east and east-north-east, respectively, in the two seasons; it appears to be fairly steady. In the narrow part of the strait, land and sea breezes are weaker and less regular. At Bengkalis the wind in the daytime is north-north-west during the North-east monsoon and south-south-west during the South-west monsoon, but it is not steady in either season.

Temperature and humidity.—Average temperature is a little below 80°. Values for Medan are given in the table on page 35. Medan is said to be cool for the lowlands, it is probable that on other parts of the coast temperature is 1° or 2° higher. The range in an average year is only 30°, between about 65° and 95°. The daily range is from 15° to 20°.

The humidity is high (*see* table for Medan on page 35). The wet-bulb temperature averages from 73° to 74° from October to February and from 75° to 76° in the other months. (*See* remarks on the combined effects of high temperature and humidity on page 30.)

Cloud.—At sea in the strait, average cloud amount is between 5 and 7 tenths during most of the year. It is below 6 tenths in February, March and June and also in July and August in the south. From September to November it exceeds 6 tenths along the whole strait and exceeds 7 tenths in October and November along the greater part of it. There is no information for the coast but on the northern part of the coast average cloudiness is probably somewhat higher than at sea during the North-east monsoon and lower during the South-west monsoon.

Rain.—The rainfall is heavy with yearly totals averaging from 80 to 100 inches. The wettest months are October to December or January; there are two comparatively dry seasons—February to March and June to August. The average number of days per month (*a*) with rain (0·04 inches or more) and (*b*) the estimated number of days with considerable rain (0·4 inches or more) are given below for several places on the coast in the wettest and driest seasons.

	Wettest months Oct.-Dec.		*Driest months Feb.-Mar. or June-July.*	
	(*a*)	(*b*)	(*a*)	(*b*)
Idi	14–19	5–14	4–6	1–2
Medan	15–17	6–7	7–8	3–4
Laboean Bilik	15–16	6–8	7–8	3–4
Bagan Si Api Api	15–16	9–10	6–7	3–4
Bengkalis	16–17	8–9	8–9	3–4

There is a good deal of variation from year to year. At Medan, for example, a dry month may have only from 2 to 4 rain days, but may have as many as 10 to 12; a wet month may have only about 15 days, but as many as 25 days in a particularly wet year, including about 12 days with considerable rain.

The most intense rain falls in the afternoon but these heavy downpours are often of short duration. At Medan the duration of rain is shortest between 0700 and 1600; during the whole of an average month there are only about 7 hours of rain in this 9-hour period, that is, rain falls for less than 1/35 of the time. Over the year as a whole rain falls for about 1/18 of the time. The duration of rain is more evenly spread over the 24 hours in the North-east monsoon than during the rest of the year when rain is most likely to occur in the evening and night.

Fog and visibility.—*See* remarks on page 25. At sea, mist or haze (reducing visibility to 5 miles or less) is most prevalent in September and October when it is recorded in from 10 to 20 per cent. of ships' observations in the south and from 5 to 10 per cent. in the north. The frequency reaches from 5 to 10 per cent. in the north from February to April and in November, and in the south in March and August.

III. **Malaya, west coast.—Winds.**—The North-east monsoon sets in during November and blows until March. Off the northern part of the coast winds are mainly northerly in November and north-easterly from December to March. In the narrow part of Malacca strait the monsoon is light and unsteady; winds are mainly northerly from November to February and variable in March. Fresh and strong winds occur most often in January, when at Alor Star, for example, about 15 per cent. of observed winds exceed 14 knots, and in the early morning force 7 is sometimes reached. Off the northern part of the coast fresh and strong winds blow mainly from between north-east and east; off the central and southern parts such winds are rare but blow mainly from between north-west and north-east. Sea breezes are weak and irregular. On the northern part of the coast the effect of the sea breeze is frequently a reduction of the strength of the monsoon in the afternoon.

In April and May winds are variable. By May westerlies become frequent in the north and southerlies in the central part of the strait. Squalls may occur. Land and sea breezes blow on the coasts.

The South-west monsoon blows from June to September; its direction is from between south-west and west in the north and from between south-east and south in the central and southern parts, where it is usually very light. In the north in July (the height of the monsoon) about 20 per cent. of observed winds exceed force 4 and from 3 to 4 per cent. reach or exceed force 7 (*see* Fig. 5). The fresh and strong winds mostly blow from south-west or west-south-west. Land and sea breezes deflect the monsoon near the coast. Sumatra squalls may occur on the southern part of the coast (*see* page 24); they usually reach it between midnight and 0400; the wind reaches force 5 or 6.

In October winds are variable, westerlies are the most frequent in October and north-west or north in November. Land and sea breezes predominate on the coasts. Squalls from north-west with heavy rain may occur, especially off the northern part of the coast.

Temperature and humidity.—Throughout the year the mean temperature is within 1° or 2° of 80°. Day maxima average between 85° and 90° and night minima between 70° and 75°, the nights are usually reasonably cool, especially during the North-east monsoon. Temperature (as recorded in the thermometer screen) rarely reaches

100° or falls below 65° near sea level. There is often a sharp decrease of temperature during afternoon thunderstorms. At Malacca maxima exceed 90° on about 12 days a year, minima exceed 75° on about 30 nights.

Relative humidity is high; on most parts of the coast the North-east monsoon is slightly less humid than the rest of the year. Averages are given in the tables on pages 36-39. The values at 0600 are approximately the maxima of the 24 hours and the afternoon values approximately the minima. Due to the high temperature and humidity the climate is oppressive all through the year (*see* remarks on page 30).

Cloud.—Cloudiness is lowest during the North-east monsoon when in January and February the average amount is from 5 to 7 tenths. On the coast there is considerable diurnal variation. The sky is frequently almost clear at dawn; but cumulus gathers during the morning sometimes producing an afternoon thunderstorm after which the sky clears. If there is no rain the sky does not clear until later.

During the South-west monsoon, cloud amount is in most areas somewhat higher but it is highest at the second monsoon change, usually October. Cloud is again mainly cumulus. Diurnal variation is smaller than during the North-east monsoon; the early morning is as cloudy as the afternoon.

The following is the average number of cloudy days (8 tenths or more) in February (the clearest month), July, and October (the cloudiest month) at four places.

	Feb.	*July*	*Oct.*
Alor Star	3	15	18
Bayan Lepas . . .	4	14	18
Bukit Jeram . . .	5	8	15
Malacca	6	10	17

Days with clear sky (2 tenths or less) are infrequent.

Rain.—Rainfall is heavy, with yearly averages over 70 inches in most parts of the coast. The wettest months are the monsoon changes April and October; the South-west monsoon, also, is wet at Malacca and the neighbouring coast on account of the frequency of Sumatra squalls. February is the driest month. The average number of rain days is given in the tables on pages 36-39. Below is given for six months the average number of days with considerable rain (0·5 inches or more). There is a good deal of variation from year to year; at Alor Star, for example, during nine years, the greatest number of such days in any one month was 13 in October, but another October had only 3.

	Feb.	*Apr.*	*July*	*Aug.*	*Oct.*	*Dec.*
Alor Star	1	7	5	8	8	4
Bayan Lepas	1	7	4	8	10	3
Bukit Jeram	2	4	2	3	5	6
Malacca	1	4	5	5	7	5

Much of the rain falls in short, heavy showers, but at times there are periods of more prolonged rain. The rain is sometimes torrential, amounts of from 7 to 9 inches have occasionally fallen in 24 hours. Rain may fall at any time of the day or night. In daylight hours (0600 to 1800) during the North-east monsoon there is most rain in the afternoon, the forenoon being usually dry. During the rest of the year the rain is more evenly distributed over these 12 hours. On the whole there is most before 0900; there is generally another maxima in the afternoon; at Malacca, however, during the South-west monsoon the afternoon is the driest part of the daytime.

Fog and visibility.—Fog is probably frequent in river estuaries for brief periods in the early morning (*see* also page 25).

Off the coast, mist or haze (reducing visibility to 5 miles or less) is recorded in more than 5 per cent. of ships' observations in the north from February to May and September to November, and in the south in May and from August to November. The frequency exceeds 10 per cent. in the north in March and in the south in September and October.

IV. **Singapore.—Winds.**—The North-east monsoon blows from December to March. It is usually light, but there are occasional squalls from north-east or northerly points, though not as a rule at the height of the monsoon. It is fairly steady and is only slightly deflected by land and sea breezes. Its direction is mainly north in the early morning, it veers towards north-east during the day. In the harbour the north-east wind gets up about 0800 and blows until about 2200; only occasionally does it blow through the night. In the Eastern roads the characteristic short seas about 2 feet ($0^{m}6$) high are sometimes reinforced by a slight swell from the east, but waves would rarely exceed 3 feet ($0^{m}9$) except in the tide-rips of the main strait.

The South-west monsoon sets in towards the end of May and lasts until September. It is not so steady as the North-east monsoon; winds are light from between south-east and south-west. As a rule the southerly winds die down at sunset; but at times a warm, hazy wind blows from between south-east and south; this wind is said to continue during the night. In the Eastern roads waves are rarely more than 2 feet ($0^{m}6$) high. " Sumatras " occur during this season. Vessels have been taken by them unawares and driven ashore. They are common during the day-time as well as at night. The day-time " Sumatras " come from between south-south-west and west, usually from south-south-west; they are as a rule of shorter duration than those at night. *See* also page 24.

During the intermonsoon periods (late March to the middle of May, and October to November) there are light variable winds. October to November is the calmest time of the year.

Temperature and humidity.—Mean temperature is about 80° throughout the year with a daily range of from about 10 to 12°. Details are given in the table on page 40. The total range to be expected in an average year is less than 25°, from 70° to 93°. Temperature (as recorded in the thermometer screen) is unlikely to reach 100° or to fall to 65° near sea level. There is often a sharp fall of temperature during afternoon thunderstorms. From April to October more than half the nights have minima exceeding 75°. During south-easterly winds at this season night temperatures are usually from 2 to 3° above normal.

Humidity is high in all seasons, averaging from about 80 to 85 per cent. The values for 0600 in the table on page 40 are approximately the average maxima for the 24 hours and those for 1300 approximately the minima. Saturation often occurs in the early morning after clear nights causing heavy dews.

The combination of the high temperature and high humidity renders the climate enervating in all seasons. The wet-bulb temperature, which gives an indication of comfort, is high, averaging from 75° to 78°. Conditions which are frequent in Singapore (maximum temperature 85° or above and wet bulb 75° or above) have been recorded in London only about 4 times in 34 years during periods of exceptional damp heat. At Singapore, however, the constant breezes afford relief. The high temperature and humidity may also cause deterioration of certain stores unless precautions are taken.

Cloud.—The sky is usually cloudy during the day-time; cumulus forms in the morning and reaches a maximum in the afternoon. Cloud tends to decrease in the evening and the sky is often clear by midnight.

Average cloud amount for 0900 and 1500 is given in the table on page 40. There is little variation during the year but October and November are the cloudiest months and February the least cloudy. During the day-time skies are very cloudy (more than 8 tenths) on about half the days during most of the year but somewhat more often in October and November and less often in February. Days with clear sky (less than 2 tenths) are very rare.

Rain.—Rainfall is rather heavy. There is no dry season. On the average the driest month is February and the wettest months are November and December, but the variations from year to year are large; November has the most reliable rainfall. Rain falls on about half the days. The average number of days a month with considerable rain (0·5 inches or more) is 3 or 4 in February and June to August, and from 5 to 7 during the rest of the year.

The rain mostly falls in heavy downpours of short duration which begin and end suddenly; they usually begin with a squall of wind and are often accompanied by thunder. During the North-east monsoon, however, especially during its advance, there are more prolonged and lighter rains. Rain may fall at any time of the day or night, but it is least likely between sunset and midnight. During the North-east monsoon there is most rain in the afternoon and early evening, during the rest of the year round noon and the early afternoon.

Fog and visibility.—Fog is not recorded at sea and is very rare on land.

At sea, mist or haze (reducing visibility to 5 miles or less) occurs most often in September and October, when it is recorded in from 10 to 20 per cent. of ships' observations; it is most likely to occur during winds between south-east and south.

On land, mist occurs sometimes in the early morning but it clears during the forenoon. Poor visibility (2 miles or less) has been recorded on about 6 to 8 mornings a month from April to June and September to December, and about 3 to 5 mornings during the other months. *See* also page 25.

V. **Sumatra, west coast.—Ujong Masam Moeka to Ajerbangis, and off-lying islands.—Winds.**—The monsoons are felt off the northern part of the coast. Near the coast they are deflected by the land and sea breezes. From November to March winds are mainly easterly at night and south-easterly during the day, the night winds being the steadier. In January easterly winds often blow night and day. From May to September winds are mainly between east and south-east at night and between south and south-west by day.

Southward of Kuala Trang, about 13 miles south-eastward of Meulaboh, winds are light and variable; northerlies and westerlies are probably the most frequent. The north-westerlies are steadiest from July to October. Near the coast, land and sea breezes predominate but are said to be weak at Sibolga. In Baai van Tapanoeli the land breeze is said to blow from north-east, veering to east or south-east in the morning; the sea breeze blows from between south-west and west.

June to November is the most unfavourable season when squalls may approach from westerly points; the strong winds blow from west or north-west (*see* page 24).

During the South-west monsoon there is usually a swell coming from a southerly or westerly direction, which increases towards Ujong Masam Moeka. Sometimes in this season a swell may come from south-west and north-west directions at the same time. An unpleasant surf is to be expected on this coast on most days from May to September, and on probably at least 10 days in October and November. December to February are the calmest months ; shelter from south-westward is, however, to be advocated at all times of the year if calmest conditions are required.

Temperature and humidity.—Temperature and humidity conditions on the coast are similar to those at Padang (*see* table on page 41). *See* also remarks on the combined effects of high temperature and humidity on page 30. Relief from the damp heat of the coast can be obtained on the high ground of the interior ; at Seriboedolok (4,659 feet (1420$^{\text{m}}$1) high) about 65 miles north-eastward of Singkel, mean temperature is about 65°.

Cloud.—At sea off this coast average cloud amount is from 5 to 6 tenths from December to June, and exceeds 6 tenths from July to November reaching from 7 to 8 tenths in the south from August to October. On the coast the amount is probably somewhat lower than at sea from December to March and higher from June to October. In the former season the afternoon is probably the cloudiest part of the 24 hours, in the latter season the diurnal variation is probably small. From May to October the east coasts of Simeuloe and Nias have less cloud than the west coasts.

Rain.—The rainfall is very heavy, with yearly totals averaging from 120 to 180 inches on the coast. It is fairly evenly distributed throughout the year, though in most areas April and from October to November have the most rain and February and from June to August the least, The following table gives (*a*) the number of rain days (0·04 inches or more) per month in the wettest and driest months, and (*b*) the estimated number of days with considerable rain (0·4 inches or more) at a number of places on the coast.

	Oct.-Nov.		*Feb., June, July*	
	(*a*)	(*b*)	(*a*)	(*b*)
Meulaboh	17	10–12	11–14	6–8
Tapa Toean . . .	18	10	10–13	5–7
Singkel	20	14–16	12–14	8
Sibolga	21	13, 14	12–15	7–9
Ajerbangis . . .	17	9, 10	9–11	4–6

Much of the rain falls in heavy thunderstorms which are very frequent over the land but they probably do not travel very far seaward. There are probably periods of continuous and less intense rain from May to October. On the coast rainfall is in general heaviest in the afternoon and during the latter part of the night.

Fog and visibility.—*See* page 25. At sea, mist or haze (reducing visibility to less than 5 miles) has been recorded in from 5 to 10 per cent. of ships' observations off the northern part of the coast from February to April and in September, November and December, and off the southern part in March, April, September and October. In other months it is less prevalent.

VI. **Sumatra, west coast.—Ajerbangis to Straat Soenda, and off-lying islands.—Winds.**—Off the coast winds are light and variable throughout the year but increase in steadiness southwards. From December to March winds from west and north-west are the most frequent. From May to October south-easterlies are the most frequent south of Pulau Bodjo and north-westerlies in the extreme north. On the coasts, land and sea breezes predominate except in the extreme south where, at Vlakke hoek, for example, the south-easterly winds are steady and land and sea breezes unimportant. Land and sea breezes are well developed at Padang and Emma haven; at Padang the land breeze blows from east or east-north-east and the sea breeze from between south-west and west. The breezes are also felt at Pulau Pandan, 12 miles from the coast, though they are less steady. At Benkoelen the wind during the afternoon is between south-west and west.

Squalls are rather frequent (*see* page 24), the strong winds blow from west or north-west.

There is probably an unpleasant surf along this coast for most of the year, but especially from May to October on beaches exposed to directions between south-east and south-west.

In Straat Siberoet weather is said to be bad in November and early December with rough seas and a swell. Squalls are said to be frequent from June to September. North-westerlies sometimes cause a heavy sea in the roads at Benkoelen.

Temperature and humidity.—The table for Padang on page 41 represents the conditions on the coast. The averages of relative humidity at 0600 and 1200 represent approximately the maxima and minima, respectively, of the 24 hours. *See* remarks about the combined effects of high temperature and humidity on page 30. Conditions are more comfortable on the higher ground in the interior; at Fort de Kock, for example, about 3,000 feet ($914^{m}4$) above sea level, the mean temperature is about 70°. On the islands the constant breezes alleviate the heat.

Cloud.—At sea off the coast the average cloudiness is as follows: January to June, from about 5 to 6 tenths; July to September, from about 7 to 8 tenths in the north, decreasing southward to about 5 tenths near Balembang; October to December, from about 6 to 7 tenths rising to 7 to 8 tenths in the north in October.

It is probable that on the coast the amount of cloud is slightly higher than at sea. The east coasts of the Mentawei eilanden are probably the least cloudy areas.

Rain.—The rainfall is very heavy with yearly totals averaging from 120 to 180 inches along most of the coast, but probably the east coasts of the Mentawei eilanden have less rain. The wettest season is from September or October to January; there is a decrease in February and an increase again in March and April. May to August are the driest months, nevertheless monthly totals average from 6 to 10 inches. The table below gives for several places on the coast (*a*) the average number of days per month with rain of 0·04 inches or more and (*b*) the estimated number of days with considerable rain (0·4 inches or more), in the wettest and driest months.

	Oct. to Dec.		*June, July*	
	(*a*)	(*b*)	(*a*)	(*b*)
Padang . . .	20, 21	13, 14	12	8, 9
Mokko Mokko . .	14, 16	10, 11	8, 9	4, 5
Benkoelen . . .	16–19	10	10	5, 6
Kroë . . .	15–17	10, 11	8, 9	5

The rain mostly falls in heavy downpours. At Padang, despite the large amount, rain falls for less than 1/10 of the time. From December to February rain is fairly evenly distributed over the 24 hours. During the rest of the year rain is most likely in the evening and night. In the 12-hour period from 0600 to 1800 there is rain for about 21 hours in an average month (that is, for about 1/17 of the time).

Fog and visibility.—*See* page 25. At sea, mist or haze (reducing visibility to less than 5 miles) has been recorded in September and October in from 10 to 20 per cent. of the observations increasing southwards. It is less prevalent in the other months, but in the south it has been recorded in more than 5 per cent. of ships' observations in all months except December to February; it is slightly less prevalent in the north.

METEOROLOGICAL STATIONS.—**Medan.**—The station is at Medan on the Deli rivier, about 11 miles southward of the entrance at Belawan. The surrounding country is low; the coast regions consist almost entirely of mud and mangroves.

Alor Star.—The station was originally at Alor Star on the Kedah river, about 5 miles from the coast. It is now at Kapala Batas airport, about 8 miles from the coast. The situation is open and the station is well exposed to the prevailing monsoons. The sea breeze would, however, set in later than on the coast; during the North-east monsoon it would rarely reach the station by 1220, the time of the afternoon observation in the table.

Penang.—The station is at Bayan Lepas airport in the extreme south-east of the island, about one mile from the south and east coasts. It is sheltered by high land westward and north-westward, and may sometimes record calms during winds from those directions.

Bukit Jeram.—The station is on a hill close to the coast. It is well exposed and the table represents conditions over the surrounding region.

Malacca.—The station is well exposed and the table represents conditions at the port.

Singapore.—The station is at Kalang airport immediately northward of Singapore road. The station is well exposed and the table represents conditions at the port.

PLACE—MEDAN. LAT. 3° 35′ N., LONG. 98° 04′ E. Height above Mean Sea Level, 77 feet.

Meteorological Table compiled from 13 to 50 Years' Observations, 1879 to 1936.

MONTH	PRESSURE at M.S.L.	AIR TEMPERATURE Mean of				Relative humidity		Cloud amount Scale 0—10		RAIN		WIND DIRECTION																		Mean wind force or speed		No. of days with gale	No. of days with fog or mist
												a.m. Percentage of observations from									p.m. Percentage of observations from												
	Mean ø	Daily max.	Daily min.	Highest in each month	Lowest in each month	0600	1200			Average fall	No. of days with 0·04 in. or more	N.	NE.	E.	SE.	S.	SW.	W.	NW.	Calm	N.	NE.	E.	SE.	S.	SW.	W.	NW.	Calm	a.m.	p.m.		
	mb.	° F.	° F.	° F.	° F.	%	%			in.																							
January	1011	85	71	89	67	94	66	—	—	5·4	11	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
February	1011	87	71	91	68	93	61	—	—	3·6	7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
March	1010	88	72	92	68	93	61	—	—	4·1	8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
April	1010	89	73	93	70	93	62	—	—	5·2	10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
May	1009	89	73	93	70	93	63	—	—	6·9	12	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
June	1009	89	72	93	69	93	63	—	—	5·2	9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
July	1009	89	72	93	68	92	59	—	—	5·3	9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
August	1009	89	72	93	69	93	61	—	—	7·0	13	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
September	1010	88	72	92	69	94	66	—	—	8·3	14	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
October	1010	86	72	90	69	94	69	—	—	10·2	17	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
November	1010	86	72	90	69	88	69	—	—	9·7	17	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
December	1010	85	72	89	68	88	68	—	—	9·0	15	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Means	1010	87	72	95*	66**	92	64	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Totals	—	—	—	—	—	—	—	—	—	79·9	142	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Extreme values	—	—	—	96†	60††	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
No. of years' observations	22	17		16		18	13	—	—	50	50	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

* Mean of highest each year. ** Mean of lowest each year. † Highest recorded temperature. †† Lowest recorded temperature. ø Reduced to mean of 24 hours.

Authorities :—Batavia, Obs. Secondary Stations Netherlands East-Indies.
Batavia, Verhandl. 24. Rainfall in the Netherland Indies.

METEOROLOGICAL OFFICE,
AIR MINISTRY.

PLACE—ALOR STAR. LAT. 6° 09′ N., LONG. 100° 23′ E. Height above Mean Sea Level, 10 feet.

Meteorological Table compiled from 3 to 9 Years' Observations, 1930 to 1938.

MONTH	PRESSURE at M.S.L.	AIR TEMPERATURE Mean of				Relative humidity		Cloud amount Scale 0—10		RAIN		WIND DIRECTION																		Mean wind force or speed		No. of days with gale ø	No. of days § with fog
												0820									1220												
												Percentage of observations from									Percentage of observations from												
	Mean	Daily max.	Daily min.	Highest in each month	Lowest in each month	0600	1300	0900	1500	Average fall	No. of days with 0·04 in. or more	N.	NE.	E.	SE.	S.	SW.	W.	NW.	Calm	N.	NE.	E.	SE.	S.	SW.	W.	NW.	Calm	a.m.	p.m.		
	mb.	° F.	° F.	° F.	° F.	%	%			in.																							
January . .	1010	89	70	92	65	94	56	4·7	6·3	1·7	6	4	56	21	1	0	0	1	2	15	5	55	27	1	0	0	1	1	10	—	—	0·1	0·3
February . .	1010	92	70	95	66	95	49	4·0	5·7	1·2	3	13	38	25	5	1	0	0	4	14	1	49	19	4	0	4	7	1	15	—	—	0·2	1
March . . .	1009	93	72	96	68	96	52	4·5	6·2	5·3	11	4	38	19	3	8	0	1	3	24	1	25	25	7	3	12	7	2	18	—	—	0·2	1
April . . .	1008	91	74	95	71	96	64	5·4	6·9	10·5	16	4	15	29	12	8	1	0	1	30	5	6	11	0	8	12	18	2	38	—	—	0·2	2
May . . .	1008	89	75	93	72	96	69	6·4	7·2	8·6	16	2	14	12	24	18	0	0	0	30	1	0	0	1	7	40	26	2	23	—	—	0·2	0·4
June . . .	1008	88	74	92	71	96	70	6·4	7·2	7·5	13	0	3	10	22	11	5	3	1	45	0	0	0	3	10	33	28	3	23	—	—	1	0·2
July . . .	1008	88	74	91.	71	96	69	7·4	7·5	6·6	15	2	3	5	16	24	6	3	2	39	2	0	1	6	12	46	9	2	22	—	—	1	0·3
August . .	1009	87	74	91	72	96	70	6·9	7·6	10·6	17	3	4	9	20	11	8	3	1	41	1	0	0	3	8	31	29	8	20	—	—	0·1	1
September .	1009	87	74	90	71	96	72	7·4	7·8	10·2	19	2	2	6	19	10	6	6	2	47	0	0	0	0	10	28	34	7	21	—	—	1	0·2
October . .	1009	87	74	91	71	96	72	7·6	8·2	13·7	21	7	23	6	10	8	0	2	3	41	2	13	1	1	5	17	19	9	33	—	—	0·1	1
November .	1009	87	73	91	71	97	71	7·0	8·2	8·3	15	8	35	6	5	7	0	0	1	38	8	21	6	1	0	12	8	6	38	—	—	0	2
December . .	1010	87	72	91	67	96	65	6·0	7·3	6·2	10	9	63	9	3	0	0	0	0	16	10	41	24	3	0	1	0	2	19	—	—	0·1	2
Means . . .	1009	89	73	97*	64**	96	65	6·1	7·2	—	—	5	24	13	12	9	2	2	2	31	3	17	9	3	5	20	16	4	23	—	—	—	—
Totals . . .	—	—	—	—	—	—	—	—	—	90·4	162	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	11
Extreme values	—	—	—	99†	62††	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
No. of years' observations	7	9				9		9		9	5	3–4																				9	9

L.S.T. (105° E.).

* Mean of highest each year.
** Mean of lowest each year.

† Highest recorded temperature.
†† Lowest recorded temperature.

§ Days on which visibility falls below ¼ mile.
ø Force 8 or more Beaufort scale.

Authority :—Malayan Met. Service, Summary of Observations.

METEOROLOGICAL OFFICE,
AIR MINISTRY.

PLACE—BAYAN LEPAS, PENANG. LAT. 5° 18′ N., LONG. 100° 16′ E. Height above Mean Sea Level, 14 feet.

Meteorological Table compiled from 4 to 5 Years' Observations, 1934 to 1938.

MONTH	PRESSURE at M.S.L.	AIR TEMPERATURE Mean of				Relative humidity		Cloud amount Scale 0—10		RAIN		WIND DIRECTION ⅓ (0900, 1500, 2100) Percentage of observations from									Mean wind force or speed		No. of days with gale ø	No. of days § with fog
	Mean ‡	Daily max.	Daily min.	Highest in each month	Lowest in each month	0600	1300	0900	1500	Average fall	No. of days with 0·04 in. or more	N.	NE.	E.	SE.	S.	SW.	W.	NW.	Calm	a.m.	p.m.		
	mb.	° F.	° F.	° F.	° F.	%	%			in.														
January	1010	88	73	91	68	88	63	5·5	5·7	4·6	10	13	25	3	2	3	15	4	3	32	—	—	0	0
February	1010	89	73	92	69	90	64	4·6	5·0	2·4	5	7	19	2	2	2	15	10	4	39	—	—	0	0·2
March	1009	89	74	92	71	95	69	6·0	5·8	5·7	13	4	12	6	3	3	16	11	6	39	—	—	0	0
April	1009	88	75	91	72	97	73	7·3	7·4	11·2	16	5	9	6	3	5	13	11	7	41	—	—	0	0
May	1009	88	75	91	73	97	74	7·7	7·6	11·5	17	4	6	4	3	5	15	7	6	50	—	—	0	0
June	1009	88	74	91	71	96	71	6·5	7·2	6·9	13	4	5	6	4	7	17	4	4	49	—	—	1	0·2
July	1008	87	74	89	70	96	70	7·1	7·4	6·8	11	2	6	4	7	19	17	4	2	39	—	—	1	0
August	1009	87	74	89	72	96	72	7·7	7·2	12·8	15	3	5	5	6	14	16	5	4	42	—	—	0	0·2
September	1010	86	74	89	71	96	73	7·6	7·8	15·8	16	5	7	8	4	6	17	7	6	40	—	—	0	0
October	1010	86	74	89	70	95	75	7·9	8·2	18·4	21	8	12	9	3	4	13	8	6	37	—	—	0	0
November	1010	85	74	89	71	95	73	6·9	7·9	10·2	19	7	18	7	3	3	13	9	6	34	—	—	0	0·2
December	1010	87	73	90	70	90	67	5·7	6·2	3·9	11	14	29	5	2	2	13	7	2	26	—	—	0	0
Means	1009	87	74	93*	67**	94	70	6·7	6·9	—	—	6	13	5	4	6	15	7	5	39	—	—	—	—
Totals	—	—	—	—	—	—	—	—	—	110·1	164	—	—	—	—	—	—	—	—	—	—	—	2	1
Extreme values	—	—	—	94†	66††	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
No. of years' observations	4	5				5		4		5	4	4											5	5

‡ ⅙ (0600, 0900, 1200, 1300, 1500, 2100). Standard of time = Local (105° E.).

* Mean of highest each year.
** Mean of lowest each year.

† Highest recorded temperature.
†† Lowest recorded temperature.

§ Days on which visibility falls below ⅝ mile.
ø Force 8 or more Beaufort Scale.

Authority :—Malayan Met. Service.

METEOROLOGICAL OFFICE,
AIR MINISTRY.

PLACE—BUKIT JERAM. LAT. 3° 15′ N., LONG. 101° 18′ E. Height above Mean Sea Level, 196 feet.

Meteorological Table compiled from 7 to 10 Years' Observations, 1929 to 1938.

MONTH	PRESSURE at M.S.L.	AIR TEMPERATURE Mean of				Relative humidity		Cloud amount Scale 0—10		RAIN		WIND DIRECTION ⅓ (9 + 15 + 21) Percentage of observations from									Mean wind force or speed		No. of days with gale ø	No. of days with fog §
	Mean	Daily max.	Daily min.	Highest in each month	Lowest in each month	0600	1300	0900	1500	Average fall	No. of days with 0·04 in. or more	N.	NE.	E.	SE.	S.	SW.	W.	NW.	Calm	a.m.	p.m.		
	mb.	° F.	° F.	° F.	° F.	%	%			in.														
January	1011	87	72	91	69	95	70	5·7	6·5	8·0	15	8	19	10	6	6	19	12	5	15	—	—	0	2
February	1010	89	72	92	70	94	66	5·2	5·8	2·8	7	6	21	9	8	5	20	11	3	17	—	—	0·1	1
March	1010	89	73	92	71	96	69	5·8	6·5	6·5	13	10	19	11	7	4	17	12	5	15	—	—	0	1
April	1009	89	73	92	71	96	71	6·3	6·9	6·9	15	11	18	10	7	6	18	10	6	14	—	—	0·4	1
May	1009	89	74	91	71	95	71	6·3	6·7	7·1	11	8	15	13	14	6	18	9	5	12	—	—	1	1
June	1009	89	73	92	70	93	69	6·0	6·5	3·8	7	5	14	19	17	7	17	8	4	9	—	—	1	0·5
July	1009	89	73	91	70	93	67	6·3	6·8	2·6	9	5	11	20	26	13	15	3	2	5	—	—	1	0·3
August	1010	89	72	92	70	93	69	6·2	6·9	5·4	11	8	15	19	18	12	14	4	2	8	—	—	1	2
September	1010	89	73	92	70	94	69	6·9	7·1	4·5	10	10	18	18	13	9	14	9	3	11	—	—	1	1
October	1010	88	72	91	70	94	71	7·3	7·7	7·9	17	13	17	10	9	4	15	12	7	13	—	—	1	2
November	1010	87	72	90	70	97	73	7·2	7·3	9·6	17	11	21	10	7	3	16	13	6	13	—	—	0·2	1
December	1010	87	72	90	70	96	75	6·6	7·2	8·6	15	11	23	8	5	3	16	13	5	16	—	—	0·5	1
Means	1010	89	73	94*	68**	95	70	6·3	6·8	—	—	9	18	13	11	6	17	10	4	12	—	—	—	—
Totals	—	—	—	—	—	—	—	—	—	73·7	147	—	—	—	—	—	—	—	—	—	—	—	7	14
Extreme values	—	—	—	98†	66††	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
No. of years' observations	7	10				10		10		10	5	9											9	10

Standard of time = Local (105° E.).

* Mean of highest each year.
** Mean of lowest each year.

† Highest recorded temperature.
†† Lowest recorded temperature.

§ Days on which visibility falls below ⅝ mile.
ø Force 8 or more Beaufort Scale.

Authority :—Malayan Met. Service, Summary of Observations.

METEOROLOGICAL OFFICE,
AIR MINISTRY.

PLACE—MALACCA. LAT. 2° 12′ N., LONG. 102° 16′ E. Height above Mean Sea Level, 149 feet.

Meteorological Table compiled from 6 to 9 Years' Observations, 1930 to 1938.

MONTH	PRESSURE at M.S.L.	AIR TEMPERATURE Mean of				Relative humidity		Cloud amount Scale 0—10		RAIN		WIND DIRECTION ⅓ (9 + 15 + 21) Percentage of observations from									Mean wind force or speed		No. of days with gale ø	No. of days with fog §
	Mean	Daily max.	Daily min.	Highest in each month	Lowest in each month	0600	1300	0900	1500	Average fall	No. of days with 0·04 in. or more	N.	NE.	E.	SE.	S.	SW.	W.	NW.	Calm	a.m.	p.m.		
	mb.	° F.	° F.	° F.	° F.	%	%			in.														
January	1010	86	73	90	70	92	66	6·4	7·7	4·1	10	24	49	6	1	2	4	6	4	4	—	—	0	0
February	1010	89	73	93	71	91	61	5·4	6·3	2·7	8	17	44	9	0	5	10	6	5	4	—	—	0	0
March	1009	87	74	92	71	93	69	6·0	6·8	8·0	11	14	38	9	2	5	11	9	6	6	—	—	0	0
April	1009	86	74	91	72	95	75	6·7	6·9	6·5	13	12	21	9	4	5	15	15	13	6	—	—	0	0·2
May	1009	86	74	89	71	94	75	6·9	6·6	7·5	15	8	13	11	9	13	15	12	10	9	—	—	0	0
June	1009	85	74	88	70	93	74	6·9	6·5	8·2	12	6	15	14	12	12	14	10	8	9	—	—	0	0
July	1009	85	74	87	70	92	74	7·1	6·8	9·6	14	3	11	24	21	18	9	5	3	6	—	—	0	0·2
August	1009	85	73	87	71	94	75	6·6	6·5	7·9	14	3	14	22	20	15	11	6	4	5	—	—	0	0
September	1010	85	74	88	71	94	74	7·4	7·4	9·6	14	5	13	13	12	14	16	11	8	8	—	—	0	0·2
October	1010	85	73	87	71	95	75	7·6	7·9	11·3	17	10	15	11	5	8	12	20	14	5	—	—	0	0·2
November	1010	85	73	88	71	95	74	7·7	7·7	8·7	17	17	19	6	4	5	10	18	16	5	—	—	0	0
December	1009	85	73	88	71	94	71	7·1	8·0	6·7	12	24	36	4	1	4	6	12	11	2	—	—	0	0
Means	1009	86	74	93*	69**	94	72	7·0	7·1	—	—	12	24	11	8	9	11	11	8	6	—	—	—	—
Totals	—	—	—	—	—	—	—	—	—	90·8	157	—	—	—	—	—	—	—	—	—	—	—	0	1
Extreme values	—	—	—	95†	68††	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
No. of years' observations	7	9				9		8		9	5	8											7	6

Zone Time (105° E.).

* Mean of highest each year.
** Mean of lowest each year.

† Highest recorded temperature.
†† Lowest recorded temperature.

§ Days on which visibility falls below ½ mile at one or more observations.

ø Force 8 or more Beaufort Scale.

Authority :—Malayan Met, Service, Summary of Observations.

METEOROLOGICAL OFFICE,
AIR MINISTRY.

PLACE—KALANG, SINGAPORE. LAT. 1° 18′ N., LONG. 103° 53′ E. Height above Mean Sea Level, 7 feet.

Meteorological Table compiled from 3 to 5 Years' Observations, 1930 to 1938.

MONTH	PRESSURE at M.S.L.	AIR TEMPERATURE Mean of				Relative humidity		Cloud amount Scale 0—10		RAIN		WIND DIRECTION																		Mean wind force or speed		No. of days with gale	No. of days§ with fog
												0720 L.S.T. Percentage of observations from									1220 L.S.T. Percentage of observations from												
	Mean	Daily max.	Daily min.	Highest in each month	Lowest in each month	0600	1300	0900	1500	Average fall	No. of days with 0·04 in. or more	N.	NE.	E.	SE.	S.	SW.	W.	NW.	Calm	N.	NE.	E.	SE.	S.	SW.	W.	NW.	Calm	a.m.	p.m.		
	mb.	° F.	° F.	° F.	° F.	%	%			in.																							
January . .	1010	86	74	89	71	94	71	7·7	8·3	7·6	12	64	17	2	0	1	1	0	15	0	40	32	7	2	0	1	3	12	3	—	—	0	0·3
February . .	1010	87	75	91	72	94	69	6·4	7·1	4·7	9	40	42	6	0	0	0	5	5	2	19	39	13	7	7	2	4	3	6	—	—	0·3	0
March . . .	1009	87	75	91	73	95	74	6·9	7·9	7·6	11	30	36	1	2	1	3	7	12	8	8	23	18	12	8	18	1	0	12	—	—	0	0
April . . .	1009	87	76	91	78	95	75	7·3	8·3	7·5	13	24	17	5	4	5	7	20	7	11	7	4	19	12	11	20	11	9	7	—	—	0·5	0
May	1009	86	76	89	72	93	76	7·0	7·8	9·9	15	1	6	10	17	15	23	19	0	9	0	0	6	14	23	40	10	1	6	—	—	0·5	0
June . . .	1009	86	77	89	72	91	74	7·3	7·6	6·1	11	1	0	10	26	28	25	6	2	2	0	0	3	11	38	36	6	1	5	—	—	0·4	0
July . . .	1009	86	77	89	72	89	73	7·2	7·3	5·4	10	0	1	3	44	25	10	10	3	4	0	0	0	12	53	31	3	1	0	—	—	0·6	0
August . .	1010	86	77	89	72	90	75	7·0	7·7	6·3	14	0	0	6	48	17	12	10	1	6	1	0	3	21	44	23	4	1	3	—	—	0	0·2
September .	1010	86	76	89	72	92	75	7·0	7·9	5·7	10	1	2	7	41	22	10	7	3	7	0	0	4	12	41	36	1	0	6	—	—	0·2	0·6
October . .	1010	85	75	89	72	93	77	8·0	8·3	7·2	14	6	8	8	8	10	17	24	8	11	1	1	4	16	23	43	9	0	3	—	—	0·4	0·2
November. .	1010	85	75	89	72	94	75	8·2	8·6	10·0	18	17	9	3	2	4	13	23	23	6	7	1	4	6	9	27	22	13	11	—	—	0·4	0
December .	1010	85	74	89	72	94	74	7·4	8·4	8·9	16	53	12	3	0	0	2	6	21	3	30	19	7	7	7	9	5	10	6	—	—	0·2	0
Means . . .	1010	86	76	93*	70**	93	74	7·3	7·9	—	—	20	13	5	16	11	10	11	8	6	9	10	7	11	22	24	7	4	6	—	—	—	—
Totals . . .	—	—	—	—	—	—	—	—	—	86·9	153	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	1
Extreme values	—	—	—	94†	70††	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
No. of years' observations	3–4	4–5		4–5		4–5		4–5		4–5	3–4	3–4									3–4											4–5	4–5

Standard of Time = Local.

* Mean of highest each year.
** Mean of lowest each year.

† Highest recorded temperature.
†† Lowest recorded temperature.

§ Days on which visibility falls below ½ mile.

Authority :—Malayan Met. Service, Summary of Observations.

METEOROLOGICAL OFFICE,
AIR MINISTRY.

PLACE—PADANG. LAT. 0° 56′ S., LONG. 100° 22′ E. Height above Mean Sea Level, 22 feet.

Meteorological Table compiled from 13–50 Years' Observations, 1879 to 1935.

MONTH	PRESSURE at M.S.L.	AIR TEMPERATURE Mean of				Relative humidity		Cloud amount Scale 0—10		RAIN		WIND DIRECTION																		Mean wind force or speed		No. of days with gale	No. of days with fog or mist
												a.m. Percentage of observations from									p.m. Percentage of observations from												
	Mean ‡	Daily max.	Daily min.	Highest in each month	Lowest in each month	0600	1200			Average fall	No. of days with 0·04 in. or more	N.	NE.	E.	SE.	S.	SW.	W.	NW.	Calm	N.	NE.	E.	SE.	S.	SW.	W.	NW.	Calm	a.m.	p.m.		
	mb.	° F	° F.	° F.	° F.	%	%			in.																							
January	1011	87	74	90	72	88	67	—	—	13·8	16	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
February	1011	87	74	91	71	88	66	—	—	10·2	13	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
March	1011	87	74	91	72	88	66	—	—	12·1	15	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
April	1010	87	75	90	72	89	66	—	—	14·3	17	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
May	1010	88	75	91	73	87	65	—	—	12·4	14	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
June	1010	87	74	90	71	86	63	—	—	12·1	12	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
July	1011	87	74	90	71	85	62	—	—	10·9	12	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
August	1011	87	74	90	71	86	64	—	—	13·7	14	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
September	1011	86	74	89	72	87	65	—	—	16·0	16	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
October	1011	86	74	89	72	88	68	—	—	19·5	20	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
November	1011	86	74	89	72	89	68	—	—	20·4	21	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
December	1011	86	74	89	72	89	69	—	—	18·9	20	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Means	1011	87	74	92*	70**	87	66	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Totals	—	—	—	—	—	—	—	—	—	174·3	190	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Extreme values	—	—	—	94†	68††	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
No. of years' observations	28	17–18				16-17	13-14			50	50	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Standard of Time = Local.

* Mean of highest each year. ** Mean of lowest each year. † Highest recorded temperature. †† Lowest recorded temperature. ‡ Reduced to mean of 24 hrs.

Authorities :—Batavia Obs. Secondary Stations, Netherlands East Indies.
Batavia Verhandl. 24. Rainfall in the Netherlands Indies.

METEOROLOGICAL OFFICE,
AIR MINISTRY.

CHAPTER II

MALACCA STRAIT, NORTHERN APPROACH—NORTH COAST OF SUMATRA, AND ADJACENT ISLANDS

Charts 830, 1355.

MALACCA STRAIT.—Malacca strait is the fairway used by vessels from Europe and India bound to Penang, Singapore, and the China sea. Its northern entrance lies between Ujong Masam Moeka (Muka), or Achin head, the north-western extremity of Sumatra, and Goh Puket, about 225 miles north-eastward.

Nicobar islands, which lie about 110 miles north-westward of Ujong Masam Moeka, are described in the Bay of Bengal Pilot.

The strait is deep throughout, the least depth in the fairway is 14 fathoms (25^{m}6), in the vicinity of One-fathom bank lighthouse. The navigable channel between the 10-fathom (18^{m}3) lines is about 4 miles wide south-westward of One-fathom bank, and about 3 miles wide south-westward of Pulau Pisang lighthouse (page 176).

For Currents and Tidal streams, *see* pages 10 and 12, respectively.

Local weather.—*See* page 25.

Chart 3869.

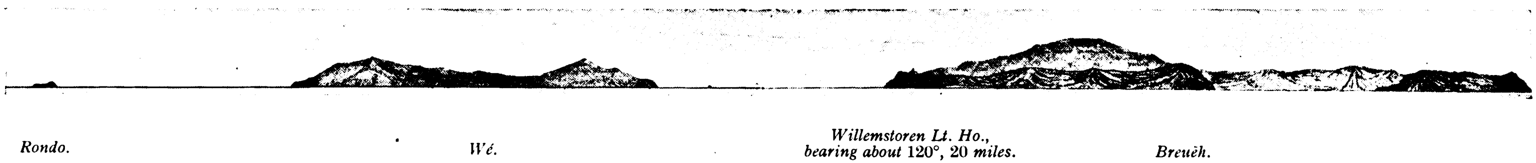
ISLANDS OFF-LYING THE NORTH-WESTERN END OF SUMATRA.—Rondo.—Rondo (*Lat. 6° 04′ N., Long. 95° 07′ E.*), an island, 499 feet (152^{m}1) high, wooded, and steep-to on its northern side, lies about 30 miles north-north-westward of Ujong Masam Moeka; it is uninhabited. Rocky islets, from 65 to 150 feet (19^{m}8 to 45^{m}7) high, lie on a reef which extends about one mile southward from its south-western side, and is steep-to on its outer edge. Landing may be effected on the lee side.

Anchorage may be obtained, in a depth of about 8 fathoms (14^{m}6), during the North-east monsoon, with the south-western extremity of Rondo bearing 103°, and the north-western extremity, 044°. In the South-west monsoon anchorage may be obtained, in a depth of 22 fathoms (40^{m}2), with the northernmost rock northward of the rocky islets in line with the southernmost large rock in line also with Tjeumo (*see* below). There are strong tide-rips off the island.

Breuëh.—Lights.—Breuëh (Bröeh) or Lam Poejang, about 7½ miles north-westward of Ujong Masam Moeka, is a rugged island, with several bays, affording anchorage according to the prevailing monsoon. Tjeumo (Chömo), near the middle of the island, is 2,234 feet (680^{m}9) high. The coast is mostly steep and craggy, but in a few places ledges and rocks extend a quarter of a mile offshore; there are sandy beaches within the bays, and along almost all the southern side.

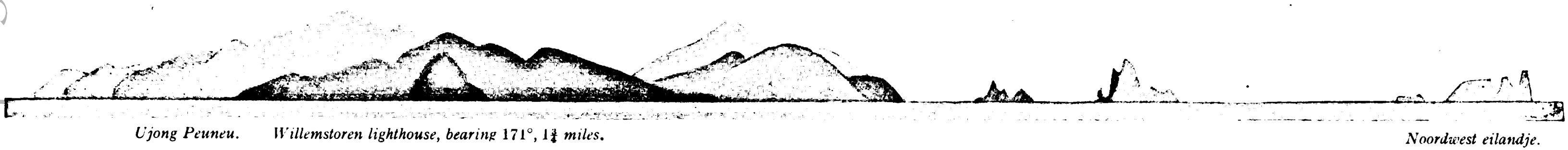
Charts 2777, 2760, 830, 70, 748b.

To face page 43.


Rondo.
Wé.
Willemstoren Lt. Ho., bearing about 120°, 20 miles.
Breuëh.

North-western approach to Bengal passage.

(*Original dated prior to* 1924.)


Ujong Peuneu.
Willemstoren lighthouse, bearing 171°, 1¼ miles.
Noordwest eilandje.

Breuëh.

(*Original dated* 1902.)

Chart 3869.

In the southern part of the island there is a considerable expanse of flat land, with villages, and coconut and sugar plantations at the foot of the hills. In the north-western part there are some small pepper plantations. There are a few inhabitants. *See* views facing this page.

Willemstoren light (*Lat. 5° 45′ N., Long. 95° 03′ E.*) is exhibited, at an elevation of 522 feet (159^{m}1), from a red circular stone tower, with a white band, 121 feet (36^{m}9) in height, on the northern extremity of Breuëh. An auxiliary light is exhibited from the same tower, at an elevation of 430 feet (131^{m}1).

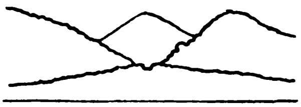
Lho Leuën (Löen) Bale is a bay on the north-eastern side of Breuëh, entered between Ujong Peuneu (Pönö), a precipitous and steep-to point, situated one mile east-south-eastward of Willemstoren lighthouse, and Ujong Gloempang (Glumpang), about 1½ miles south-south-eastward. In the north-western part of the bay there is a sandy beach and some buildings. There is a small pier at the head of the bay suitable for use by praus.

A strong current usually sets northward past Ujong Peuneu.

The north-eastern coast of the island between Ujong Gloempang and the south-eastern extremity is rocky. Lam Poejang (Puyang) village stands about three-quarters of a mile north-north-westward of the south-eastern extremity of the island.

Balken baai and Lho Kroeët (Kruet) or Zand baai, separated from each other by a high point, lie on the northern and eastern sides, respectively, of an inlet on the western side of Breuëh, entered between Ujong Sigeude (Sigode), situated half a mile south-eastward of the western extremity of the island, and Ujong Peung (Pong) Aroih, about 1½ miles farther south-eastward. There is a sandy beach at each bay.

Sidom eilanden are two islands, the northern of which is 138 feet (42^{m}1) high, lying close southward of Ujong Sigeude. Rocks, on which the sea breaks, extend 1½ cables south-westward from them. Si Meregoeh (page 47), a noticeable dome-shaped peak in the island of Wé, seen through the valley within Lho Kroeët, bearing about 076°, leads 3 cables southward of these dangers. The channel between Sidom eilanden and Breuëh is clear of dangers, but there is a strong current.



Si Meregoeh peak, bearing 076°.
(*Original dated* 1929.)

At the head of Balken baai is the large village of Meulingge (Mölingge), and on the southern side of Lho Kroeët is a rocky point, 200 feet (61^{m}0) high.

Lho Lam Baro is a bay entered between a point about 2¼ miles southward of Ujong Peung Aroih and Ujong Serapong, about 1½ miles south-south-eastward. Oe (U), a rocky islet, 105 feet (32^{m}0) high, lies about a quarter of a mile westward of the northern entrance point of the bay ; a rock, on which the sea always breaks, lies about one cable westward of Oe. The passage between Oe and Breuëh is not recommended.

Toean (Tuan) Dipat, an islet, 98 feet (29^{m}9) high, connected to the southern side of Breuëh by a reef, lies about 3½ miles east-north-eastward of Ujong Serapong.

Off-lying islands and dangers.—Noordwest eilandje (North-west islet) is a rocky islet, 46 feet (14^{m}0) high, and fringed by a narrow

Charts 2777, 2760, 830, 70, 748b.

Chart 3869.

reef of rocks, lying about 5½ miles north-westward of Willemstoren lighthouse.

Fleursklip, a rock which dries, lies about 2 miles north-westward of the western extremity of Breuëh. The water in this vicinity is discoloured, and the sea breaks at times.

Hoog eilandje and Kegel eilandje lie about three-quarters of a mile north-westward and north-north-eastward, respectively, of the north-western extremity of Breuëh. A rock, which dries, lies half a mile south-westward of Kegel eilandje. The sea breaks over these dangers even in moderate weather. They are covered by a *red* sector of Willemstoren light between the bearings of 083° and 166°.

There is a clear passage between Noordwest eilandje and these islets, but vessels are recommended to pass outside them all.

Keureuse (Köröse) or Nasi kechil, 834 feet ($254^{m}2$) high, and densely wooded, lies about 6 cables southward of Ujong Serapong ; its northern coast is rocky and steep, and on its southern and eastern sides there are sandy beaches. A sandy spit, with depths of less than 3 fathoms ($5^{m}5$), extends about 3½ cables from the northern extremity of the island.

Aroïh Keureuse (Köröse), the passage between Breuëh and Keureuse, is about 4 cables wide between the northern edge of the sandy spit mentioned above and the southern side of Breuëh, and has a least depth of 7 fathoms ($12^{m}8$) in the fairway. The tidal streams in the passage attain a maximum rate of 5 knots.

Gepon eilanden (*Lat. 5° 37′ N., Long. 95° 03′ E.*) are a group of four islets lying about half a mile southward of the southern extremity of Keureuse ; the southernmost of the group is a rock about 30 feet ($9^{m}1$) high, the others being wooded and about 130 feet ($39^{m}6$) high. The channel between the islands and Keureuse is clear of dangers, and the tidal streams are weak.

Anchorages.—Good anchorage may be obtained during the South-west monsoon, in a depth of 7 fathoms ($12^{m}8$), in Lho Leuën Bale, close south-westward of Ujong Peuneu, and although squalls from the hills are sometimes violent, the water is smooth, but a considerable sea sets in during the North-east monsoon.

A safe anchorage may be obtained during the North-east monsoon, in Balken baai and Lho Kroeët, in depths of from 8 to 9 fathoms ($14^{m}6$ to $16^{m}5$), fine sand ; in the South-west monsoon there is considerable swell and sea.

A good anchorage may be obtained during the North-east monsoon in Lho Lam Baro, also westward of Toean Dipat. Landing is easily effected on the eastern side of this islet.

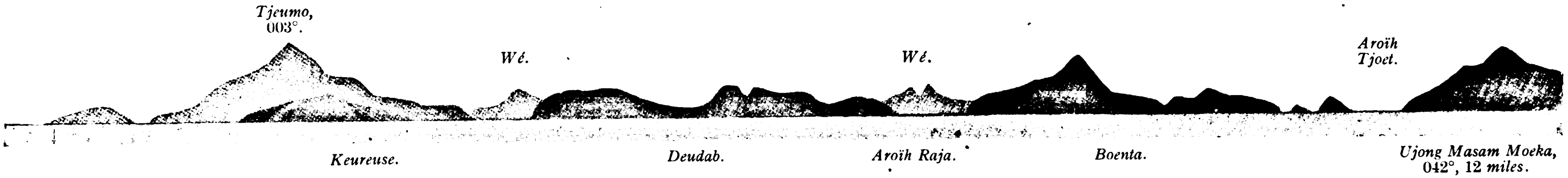
Chart 3870, plan of Lam Puyang strait.

Aroïh Lam Poejang.—Dangers.—Aroïh Lam Poejang (Lam Puyang strait), separating the south-eastern extremity of Breuëh from Deudab (Dödab), is 1½ cables wide, with a least depth of 11 fathoms ($20^{m}1$) in the fairway. It should only be used by small vessels, as the tidal streams are irregular, and the shoals are unmarked.

A 2¾-fathom ($5^{m}0$) patch lies on the southern side of the fairway, about 2 cables north-westward of the western extremity of Deudab, and a shoal, with a least depth of 2½ fathoms ($4^{m}6$) at its south-eastern end, lies on the northern side of the fairway, about 2¼ cables farther north-westward.

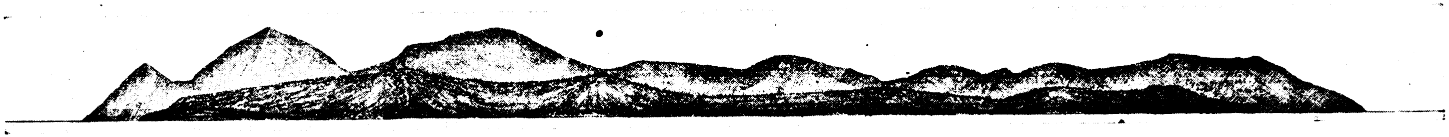
Charts 2777, 2760, 830, 70, 748b.

To face page 45.



Aroïh Tjoet and Aroïh Raja.

(*Original dated* 1902.)



Wé, bearing about 250°, distant 20 miles.

(*Original dated prior to* 1924.)

Chart 3869.

Deudab.—Deudab or Nasi besar, 978 feet ($298^{m}1$) high, near its western side, is fairly thickly populated, the inhabitants being mostly engaged in the cultivation of pepper.

The coastline is rocky in places, and in others, chiefly on the western side, there are sandy beaches.

Rots baai, on the north-eastern side of the island, is about 4 cables wide at its entrance between Ujong Krieuë (Kriöe) and a point about half a mile southward; half a cable north-eastward of the latter point is Djeuroh (Jöroh), an islet, 161 feet ($49^{m}1$) high. There is a depth of 4¼ fathoms ($7^{m}8$) between Djeuroh and Deudab. At the head of the bay sunken rocks extend about 2 cables offshore.

Anchorages.—Anchorage in Rots baai is unsafe, but temporary anchorage may be obtained about 2 cables south-eastward of Djeuroh, in a depth of 7 fathoms ($12^{m}8$).

Good anchorage may be obtained during the North-east monsoon, in depths of from 6 to 8 fathoms ($11^{m}0$ to $14^{m}6$), fine sand, in Lho Pasi Djaning (Janing), off the village of the same name, situated about one mile north-eastward of Ujong Bangsi, the western extremity of Deudab. Landing may be effected at the village, where there is a break in the fringing reef.

Temporary anchorage may be obtained, in depths of from 7 to 10 fathoms ($12^{m}8$ to $18^{m}3$), off the southern side of Deudab, in Lho Aloer Ajeun (Lho Alur Ayom), entered between Ujong Ratbakah (*Lat. 5° 36′ N., Long. 95° 07′ E.*) and Ujong Baoe (Bau), about 1¼ miles eastward, but the east-going stream in Aroïh Raja is felt here. During westerly winds the anchorage is not tenable.

Aroïh Raja.—Dangers.—Aroïh Raja (Raya) or Cedar passage lies between the southern side of Deudab on the north and Boenta (Bunta) and Bateë on the south, and is about 1½ miles wide. *See* view facing this page.

Ujong Bateë, the south-western extremity of Deudab, is the northern point of the western entrance of the strait, and is clear of dangers. A rock, which dries, lies about one cable southward of Ujong Ratbakah, and another rock, which dries, lies one mile south-south-westward of the same point. The southern coast of Deudab between Ujong Baoe and Ujong Doengon (Dungon), about 1¼ miles north-eastward, and thence to Ujong Eumpeë (Ompee), the south-eastern extremity of the island, is low, with some dwellings near the coast. There is a break in the fringing reef about midway along this stretch of coast, visible from the strait, through which boats can effect a landing.

About 1¼ miles eastward of Ujong Baoe and three-quarters of a mile from the southern side of Deudab is a rock, which dries, close northward of which is a rock, with a depth of 1½ fathoms ($2^{m}7$); these rocks, which are usually marked by breakers, lie near the south-western end of a bank which has depths of less than 10 fathoms ($18^{m}3$).

Boenta, an island, 776 feet ($236^{m}5$) high, nearly covered to its summit with coconut palms, lies about 2 miles south-south-eastward of Ujong Baoe. It is fringed by a reef with boulders on it in places; the reef extends about a quarter of a mile west-south-westward from the western extremity with a large rock at its outer end, and also half a cable eastward from Ujong Bada, the eastern extremity, with rocks above water at its outer edge. A spit, with depths of from 3½ to 4¼ fathoms ($6^{m}4$ to $7^{m}8$), extends about 6 cables northward from

Charts 2777, 2760, 830, 70, 748b.

Chart 3869.

Ujong Bada. Small craft may obtain temporary anchorage over this spit, but the tidal streams are strong. There is a village on the northern side of the island.

A bank, with a least depth of 7 fathoms ($12^{m}8$), lies about 2 miles south-westward of the western extremity of Boenta.

Bateë, an island 425 feet ($129^{m}5$) high, and mostly wooded, but cultivated on its southern side, lies with its western extremity one mile north-eastward of Ujong Bada; there are some houses on its northern side. An islet, named Oesamlakoh (Usamlokoh), the northern side of which rises almost vertically, and is steep-to, lies about one cable westward of the western extremity of Bateë.

Loempat (Lumpat) is an island lying about 1½ cables eastward of the eastern extremity of Bateë, with foul ground, on which there are some rocks above water, between them.

Aroïh Tjoet.—Aroïh Tjoet (Chut) or Surat pass, between Boenta, Bateë, and Loempat on the north-west, and the coast of Sumatra between Ujong Raja (Raya) or King point (page 239) and Ujong Masam Moeka on the south-east, has a least width of 2 cables at its north-eastern end between Loempat and Ujong Masam Moeka, and is deep in the fairway. *See* view facing page 45.

On the north-western side of the fairway, about 1¼ miles east-south-eastward of Oesamlakoh (*Lat. 5° 34′ N., Long. 95° 11′ E.*), there is a 6-fathom ($11^{m}0$) patch, and on the south-eastern side, about 1¾ miles north-eastward of Ujong Raja and about 2 cables offshore, is a 5½-fathom ($10^{m}1$) patch.

Tidal streams.—In Aroïh Raja and Aroïh Tjoet the east-going stream has a rate of from 4 to 5 knots at springs, and the west-going stream from 5 to 6 knots; they run strongest along the northern side of Bateë. During the west-going stream there is an eddy setting southward from Ujong Eumpeë, and there is a strong inset between Bateë and Oesamlakoh.

Tide-rips, appearing like breakers, form in Aroïh Raja and Aroïh Tjoet; they are most violent with the wind against the stream, but are comparatively moderate in the North-east monsoon; they are sometimes dangerous to small craft at anchor.

There is an eddy off Loempat, which, combined with the tidal stream setting between Boenta and Bateë, causes a confused sea, which sometimes assumes the character of a whirlpool.

Directions.—Aroïh Raja is only available for steam vessels on account of the strong tidal streams. A vessel approaching from the southward should give the western point of Boenta a berth of at least one mile, and when the northern point of the same island bears 090° should steer to pass northward of it, and thence north-eastward.

Aroïh Tjoet is available for small vessels with a speed of not less than 8 knots. A vessel approaching from southward should steer for Ujong Raja (page 239), which is difficult to identify from a distance. After rounding this point she should steer for the north-eastern entrance of the strait, which will appear open, bearing 049°. A good speed must be maintained when passing through this narrow passage; thence she may alter course round Ujong Masam Moeka or proceed northward towards Wé.

A vessel bound westward through Aroïh Tjoet should steer for the summit of Boenta, bearing about 247°, passing midway between Ujong

Charts 2777, 2760, 830, 70, 748b.

Chart 3869.

Masam Moeka and Loempat, thence closing the south-eastern shore of the passage, especially during the west-going tidal stream.

Wé.—Light.—Wé, the north-easternmost and largest of the islands off the north coast of Sumatra, is separated from it by Malacca passage, 9 miles wide ; it is mountainous, and covered with luxuriant vegetation. Leumo (Lömo) Mate, 2½ miles northward of Ujong Meudoeroë (Möduroe), the southern extremity of the island, is 2,147 feet ($654^{m}4$) high, and about 1½ miles southward of it is Si Meregoeh, 1,851 feet ($564^{m}2$) high ; Laboe Baoe (Labu Bau), 1,231 feet ($375^{m}2$) high, is situated about 2¾ miles southward of Ujong Tapa Gadja (Gaja) ; the north-eastern extremity of the island is prominent. Except in a few places, the coast is rocky, rising sheer from the sea. The eastern and western sides are generally steep-to ; on the northern side are Lho Pria Laot and Sabang baai, and on the south-eastern side is Balohan baai. Safe anchorage can only be obtained in the innermost portion of the large bays, close inshore. *See* view facing page 45.

Small villages are scattered over the island, which is thinly populated. The principal industries are pepper growing and fishing ; sulphur is found in considerable quantities. Aneu (Anö) Laot, a small lake, lies nearly half a mile south-eastward of Sabang baai.

Ujong Baoe (Bau) (*Lat. 5° 54′ N., Long. 95° 13′ E.*), the north-western extremity of Wé, descends steeply from the mountains and is steep-to. The whole of the west coast is cliffy, except for a sandy bay, named Teupin Anoë (Topin Anoe), entered between Ujong Poetroë (Putroe), 3¾ miles south-south-eastward of Ujong Baoe, and Ujong Goeha (Guha) Sarang, 1¾ miles farther, but a steep-to reef, with a depth of 3¼ fathoms ($5^{m}9$), extends 2 cables offshore about 1¼ miles southward of Ujong Baoe.

Karang Berdoeri (Berduri), which dries 5 feet ($1^{m}5$), lies about 3 cables southward of Ujong Meudoeroë ; there are usually strong tide-rips or overfalls near this rock.

Balohan baai, entered between Ujong Teupin Pineung (Töpin Pinong), situated about 1½ miles north-eastward of Ujong Meudoeroë, and Ujong Seuke (Söke), the south-eastern extremity of Wé, has considerable depths ; a reef fringes the eastern and western sides of the bay to a distance of half a cable. Ujong Seuke is high and steep-to. A safe anchorage may be obtained close inshore. There is a sandy beach at the head of the bay, and also a jetty.

Some distance inland from the head of the bay is Balohan, the largest village on the island, and the residence of the chief of Wé, and near it are some fresh water springs and a stream ; there is a sulphur mine in this part of the island, and fumes issue from a small crater near the foot of a hill.

The east coast of the island appears to be steep-to. Ujong Tapa Gadjah, is not very high, but rises rapidly towards the mountains within, and can be clearly seen.

Ië Meule light is exhibited, at an elevation of 52 feet ($15^{m}8$), from a white iron framework structure, 42 feet ($12^{m}8$) in height, surmounted by a white diamond daymark, about 4 cables south-eastward of Ujong Tapa Gadjah.

Lho Pria Laot.—Dangers.—Lho Pria Laot is the head of the bay which is entered between Ujong Baoe and Ujong Tapa Gadjah. From Ujong Baoe for 2 miles south-eastward, the western side of the

Charts 2777, 2760, 830, 70, 748b.

Chart 3869.

bay is fringed by a narrow, steep-to reef. Seulakoë (Sölakoe) and Roebiah (Rubia) are two islands on the western side of the bay, with a rock above water between them ; between this rock and the southern extremity of Seulakoë there is foul ground, and between the rock and the northern extremity of Roebiah there is a depth of 15 fathoms (27^{m}4). Seulakoë is 161 feet (49^{m}1) high ; a rock, above water, lies about one cable northward of it. There are some small wooded hillocks on Roebiah, those at the northern end being the highest ; a rock, which dries, lies a quarter of a cable south-westward of the southern extremity.

A reef, with rocks above water on it, extends 2 cables north-eastward from Ujong Bateë Meuroenroeng (Mörunrung), situated on the western side of the bay about 3¾ miles south-eastward of Ujong Baoe ; some rocks, which dry, lie close outside the outer rock. Rondo, bearing about 321°, open north-eastward of Seulakoë, leads north-eastward of these dangers.

A shoal, with a depth of 3¾ fathoms (6^{m}9) and steep-to, lies about 2 cables north-north-eastward of Ujong Bateë Meutijen (Mötyen), situated one mile south-south-eastward of Ujong Bateë Meuroenroeng.

Near the head of Lho Pria Laot are a few streams of sulphur-laden water.

Anchorage.—The usual anchorage is eastward of the southern end of Roebiah. Anchorage may be obtained near the head of Lho Pria Laot, in depths of from 9 to 12 fathoms (16^{m}5 to 21^{m}9), close westward of Pria Laot rivier, the bar of which dries.

Tidal streams.—The in-going tidal stream sets through the channel between Roebiah and the main island at a rate of 3 knots at springs ; the out-going stream is much weaker. At the entrance to Sabang baai and in the bay itself there is no appreciable stream, but off Ujong Masam (*Lat. 5° 54′ N., Long. 95° 18′ E.*), about one mile west-south-westward of Ujong Tapa Gadjah, there is always a set towards the entrance to the bay.

Quarantine.—*See* page 50.

Chart 3870, plan of Sabang bay.

Sabang baai.—Lights.—Beacon.—Buoys.—Sabang baai is entered between Ujong Lho Mé, a low point, situated 6½ cables south-south-eastward of Ujong Masam, and Klah, an island about half a mile south-south-westward. The head of the bay is completely sheltered from wind and sea at all seasons. Southward of Klah is Lho Krueng Raja (Raya), a small enclosed bay.

The eastern side of Sabang baai, is fringed by a bank, with depths of less than 3 fathoms (5^{m}5), which extends as much as 1¼ cables offshore ; the northern side of the bay, where the wharves and settlement are situated, is clear of dangers. Ujong Lho Mé, from which a jetty extends southward, and the coast north-westward of it is fringed by a bank, with depths of less than one fathom (1^{m}8), which extends about three-quarters of a cable offshore.

Ujong Seukoendo (Sökundo), the south-western entrance point of the bay, is high and wooded.

There is a conspicuous white house on the eastern shore of the bay, 3 cables south-south-eastward of the southern end of the Commercial wharf.

Klah is entirely overgrown except on its eastern side ; on its southern

Charts 2777, 2760, 830, 70, 748b.

Chart 3870, plan of Sabang bay.

side is a cove with a small pier. Its western end is connected with the main island by a reef, with a depth of 1¾ fathoms (3^{m}2) in the fairway. A beacon stands at an elevation of 96 feet (29^{m}3), at the north-western end of the island.

A light is exhibited, at an elevation of 105 feet (32^{m}0), from a white iron framework structure, surmounted by a white diamond daymark, 42 feet (12^{m}8) in height, on the north-western side of Klah.

A light is exhibited, at an elevation of 53 feet (16^{m}2), from a white iron framework structure, surmounted by a white rectangular daymark, 49 feet (11^{m}9) in height, on Ujong Lho Mé.

Two white conical buoys are moored off the northern and north-eastern ends, respectively, of the shoal extending northward from Klah.

Anchorages.—Mooring buoys.—Good anchorage may be obtained off the settlement, out of the swell, in depths of from 15 to 20 fathoms (27^{m}4 to 36^{m}6), sand, clay, and coral.

Anchorage may also be obtained by small vessels in Lho Krueng Raja, in a depth of 10 fathoms (18^{m}3), mud, but the channel leading to it on the eastern side of Klah is less than one cable wide with a least depth of 2¾ fathoms (5^{m}0) in the fairway. On the western side of the fairway about three-quarters of a cable south-eastward of the eastern extremity of Klah is a rock which dries.

There are several mooring buoys in the bay, the positions of which may best be seen on the chart.

Settlement.—Wharves.—On the plateau above the town are a hospital, the residences of the Europeans, and the offices of the Civil authorities.

West wharf, close north-eastward of Ujong Lho Mé (*Lat. 5° 53′ N., Long. 95° 19′ E.*), had, in 1946, a least depth of 26 feet (7^{m}9) at its south-western end. The Coal wharf, north-eastward of West wharf, had a least depth of 30 feet (9^{m}1). Commercial wharf, eastward of the Coal wharf, has a least depth of 29 feet (8^{m}8).

Vessels are usually berthed alongside the wharves, arrangements being made by the Sabang Company.

The best landing place for boats from vessels anchored in the bay is at the eastern end of the Coal wharf, close to the Harbour master's office.

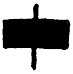
Signal station.—There is a signal station on Peunimpoen (Pönimpun), a hill 279 feet (85^{m}0) high, about half a mile northward of Ujong Lho Mé. Messages will be received and transmitted through Lloyd's. It is connected to the general telegraph system. This station was reported, in 1946, to be disused.

Chart 70.

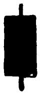
Weather signals.—In connection with the system of storm signals in use at Indian ports, the following signals are displayed from Peunimpoen signal station with regard to meteorological information for the Bay of Bengal :—

1. No weather disturbances exist in the Bay of Bengal .

2. (*a*) There is a region of squally weather in which a storm may be forming . . . . . .



   (*b*) A storm has formed . . . .



Charts 2777, 2760, 830, 70, 748b.

Chart 70.

In order to indicate the position of the disturbances described under paragraph 2 above, the Bay of Bengal is divided into six sections, defined as follows :—

I.—Contains the area north of lat. 18½° N.

II.—Lies south of I; it is bounded on the south by lat. 13° N. and on the east by long. 88½° E.

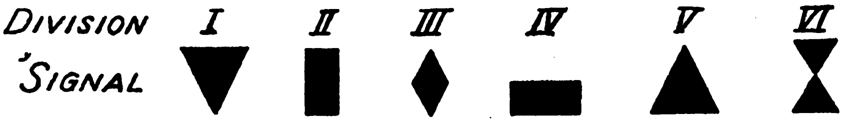
III.—Lies south of I and east of II; it is bounded on the south by lat. 13° N. and on the east by a line from the point situated in lat. 13° N., long. 93° E. to Diamond island (*Lat. 15° 52′ N., Long. 94° 17′ E.*), together with the Arakan coast, thence up to lat. 18½° N.

IV.—Lies south of II and west of long. 86° E.

V.—Lies east of IV, south of II and III, and west of long. 93° E.

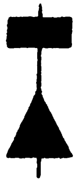
VI.—Lies east of III and V, including the sea around the Andaman islands.

The following shapes have been allotted to each of the divisions :—

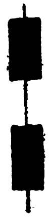


The signals denoting position will be displayed under the signal indicating the disturbance. For example :—

If there is squally weather in Section V of the bay the following signal would be displayed . . . .



If a storm has formed in Section II the following signal would be displayed . . . .



If the centre of the storm is near the boundary of a division, two locality signals will be given, the first indicating the division in which the centre is supposed to be and the second the neighbouring division near to which it is. In the event of a storm centre being near to the angles where three divisions meet, three locality signals will be displayed. The first will give the division in which the storm is supposed to be, the second the nearest adjoining division and the third the remaining division.

Chart 3870, plan of Sabang bay.

Quarantine.—Health.—The quarantine station is on Roebiah (page 48). Epidemics are unknown, and the island is very healthy. For deratisation, *see* page 17.

Chart 3870, plan of Sabang bay.

Communication.—There is regular steamer communication with Europe.

Chart 3869.

Bengal passage.—Bengal passage, between Breuëh and Wé, is deep, and is the best approach for vessels proceeding through Malacca strait from westward. South-westerly or north-easterly winds prevail according to the season, and are fairly steady. *See* view facing page 43.

There is usually a north-westerly current of from one to 2 knots through the fairway; near the south-western shore the streams are tidal, and anchorage may be obtained if necessary.

It is the best passage at all times for vessels proceeding westward.

Chart 2777.

NORTH COAST OF SUMATRA.—Aspect.—The coast between Ujong Masam Moeka (*Lat. 5° 35′ N., Long. 95° 13′ E.*) and Diamond point, about 140 miles eastward, is inhospitable and without conspicuous landmarks; in places the cliffs rise precipitously from the sea to a considerable height, crowned by dense vegetation; in other portions there are sandy beaches, or cultivated plains reaching to the coast, with numerous villages scattered over them. Inland are several mountain ranges, with prominent mountain peaks affording ready means for fixing the position of a vessel; many of these peaks are within 12 miles of the coast. All the mudbanks extending from the entrances to the rivers were reported, in 1943, to be extending.

Chart 3869.

Gle Raja (Raya), 2,041 feet (622^{m}1) high, is the highest part of the Paran gebergte, of which Ujong Masam Moeka is the northern extremity. Salam, 5,325 feet (1623^{m}1) high, lies about 11 miles south-south-eastward of Gle Raja. A chain of hills lies within Pedro punt, about 14 miles east-north-eastward of Ujong Masam Moeka; these hills, which are about 1,000 feet (304^{m}8) high, are undulating and sparsely wooded, and form the north-western spur of Seulawaih (Sölawaih) Agam or Goudberg (chart 2777).

Chart 2777.

Eumpeë Roetong, 792 feet (241^{m}4) high, with a green summit, lies about 3 miles south-westward of Ujong Bateë Poeteh (Puteh), situated about 10 miles eastward of Pedro punt. Seulawaih Agam, about 11 miles south-south-eastward of Ujong Bateë Poeteh, is cone-shaped, 5,936 feet (1809^{m}3) high, and noticeable. Seulawaih (Sölawaih) Inong or Weesberg, 2,928 feet (892^{m}5) high, lies about 7 miles eastward of Seulawaih Agam, and may be easily identified by its flattened cone, which has a slight depression in the middle.

Samalanga, 11 miles south-south-eastward of Ujong Meureudoe (Morödu), situated 45 miles south-eastward of Ujong Bateë Poeteh, is dome-shaped and 4,316 feet (1315^{m}5) high. A summit 5,418 feet (1651^{m}4) high, 3 miles westward of Samalanga, may be identified by a waterfall on its north-western side. Poentjek (Punchek), 5,011 feet (1527^{m}4) high, lies 4¼ miles east-south-eastward of Samalanga, and is a flattened cone, not easily identified. Gle Goh, 3,069 feet (935^{m}4) high, lies about 15 miles south-eastward of Ujong Radja (Raja), situated 12½ miles eastward of Ujong Meureudoe; it resembles an elephant facing westward.

Charts 2777, 2760, 830, 70, 748b.

Chart 2777.

Gunong Pandjang is a tableland about 18 miles long, lying in an easterly and westerly direction, the western extremity of which lies about 28 miles southward of Ujong Peusangan (Pösangan), situated 22 miles eastward of Ujong Radja. It is the eastern spur of Geureudong (Görödong), which has two craters like truncated cones about 2¾ miles apart, the south-western being 9,424 feet (2872^{m}4) high, and the north-eastern 9,122 feet (2780^{m}4). At the eastern end of the tableland is Oedjeuën (Ujuen), 6,314 feet (1924^{m}5) high. Between this and Diamond point (*Lat. 5° 15′ N., Long. 97° 30′ E.*) there are no ranges.

Chart 3869.

Coast.—The coast between Ujong Masam Moeka and Ujong Raja, 3½ miles south-south-westward, forms the north-western extremity of Sumatra; both these points are bluff promontories, and the former is steep-to.

Between Ujong Masam Moeka and Pedro punt the coast is rocky and steep for about one mile south-eastward of the former, thence it is sandy to Pedro punt; except off Ujong Masam Moeka, the depths shoal gradually towards the coast, the bottom being composed of black sand for about 3 miles offshore, and white sand and shells outside that distance. In 1945, less water was reported about 2 miles north-westward of the pier at Oeleë Lheuë.

In places, especially near Kuala Gigieng, 3¾ miles south-westward of Pedro punt, there are sandhills, within which the land is, to a large extent, a morass, with scanty vegetation, but in places there are some fairly high trees. The morass is intersected by creeks and lagoons, with dikes or footpaths connecting the several villages, which generally stand on higher ground and are usually covered with reeds, lofty coconut palms, or cultivated ground; many are visible from seaward. Koeta Radja (Kuta Raja), the capital of Achin province, lies in the valley of Great Achin, about 1½ miles inland.

Kuala Pantjoe (Panchu), the mouth of the lagoon close eastward of Ujong Pantjoe (Panchu), situated nearly one mile east-south-eastward of Ujong Masam Moeka, has a depth of 1½ feet (0^{m}5), the channel passing close to the point. The lagoon is very shallow and is inaccessible for boats; a large village of the same name stands on its eastern shore.

Toean (Tuan), a dome-shaped islet, lies on the outer edge of the flat fringing the coast, three-quarters of a mile east-south-eastward of Ujong Pantjoe, with which it is connected by a ridge of rocks in places. There is no channel between the islet and the coast southward except for boats. Landing may be effected on the southern side of the islet; there is a burial ground on the summit.

Oeleë Lheuë.—Light.—Oeleë Lheuë or Olehleh, the port of Koeta Radja, is situated about 2½ miles east-south-eastward of Ujong Pantjoe; it stands on the narrow spit of sand which separates Tjangkoj (Changkoy) lagoon from the sea. There are European and Chinese quarters in the town.

Kuala Tjangkoj, the mouth of the lagoon, lies close westward of Oeleë Lheuë, and has a depth of 3½ feet (1^{m}1). The lagoon is shallow, but there are passages for canoes leading southward of Oeleë Lheuë, thence eastward to Atjeh (Achin) rivier, and westward to Pantjoe lagoon.

A light is exhibited, at an elevation of 34 feet (10^{m}4), from a mast on the head of the pier.

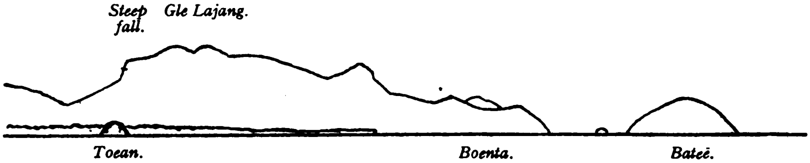
Chart 3869.

The limit of the roadstead is a line joining Ujong Masam Moeka and the mouth of Atjeh rivier.

Anchorage.—Directions.—Good anchorage may be obtained, in depths of from 4 to 5 fathoms (7^m3 to 9^m1), black sand, off the pier. At the height of the monsoon a good scope of cable is necessary and vessels of deep draught should anchor farther out. There is a heavy sea at times in both monsoons, and smooth water can only be depended on for a week or two at the change of the monsoons. Vessels should have a second anchor ready and keep steam at short notice, as the weather is unreliable.

During the South-west monsoon violent gusts blow from the valley southward of Ujong Masam Moeka (*Lat. 5° 35′ N., Long. 95° 13′ E.*), and, during the North-east monsoon, the sea and swell are sometimes so heavy that communication with the shore is interrupted, and the sea almost breaks in a depth of 3 fathoms (5^m5). Land and sea breezes often blow during both seasons, but the land breezes do not extend beyond the islands. The forenoon is generally calm, and the best time for landing. The roadstead is infested by sharks.

A vessel approaching Oeleë Lheuë from north-eastward should, after passing the mouth of Atjeh rivier, keep Toean in line with the steep fall on the south-eastern side of Gle Lajang (Layang), situated about 1½ miles southward of Ujong Masam Moeka, bearing 235°, which leads through in a least depth of 5 fathoms (9^m1).



Toean in line with steep fall of Gle Lajang, bearing 235°.

(*Original dated prior to* 1924.

Prohibited anchorage.—Anchorage is prohibited in an area indicated by pecked lines on the chart north-eastward of a line drawn 320° from the cable house, situated about 3 cables north-eastward of the light-structure.

Tidal streams.—The east-going tidal stream setting against the prevailing westerly current is weak, having a mean rate of half a knot. The west-going stream runs longer than the east-going stream, and has a mean rate of three-quarters of a knot.

Harbour facilities.—Fresh provisions may be obtained. There is a hospital at Koeta Radja.

There is a small pier, equipped with two cranes of 1½ and 3 tons lifting capacity, connected to the railway system. The pier was reported, in 1946, to be unserviceable.

Communication.—There is regular steamer communication. Oeleë Lheuë is connected by steam tramway with Koeta Radja and thence with the railway on the east coast. *See* page 3.

Atjeh rivier.—Atjeh (Achin) rivier, which is only navigable by boats, flows out about 2¾ miles north-eastward of the light structure on the pier at Oeleë Lheuë. The channel in the approach is constantly shifting.

Charts 2777, 2760, 830, 70, 748b.

Chart 3869.

Koeta Radja, the residence of the Governor, stands on both banks of Atjeh rivier. Here also are the Government offices.

Except on the coast near Oeleë Lheuë and Koeta Radja, the climate is unhealthy. The inhabitants are employed principally by growing rice and raising pepper.

Coast.—Gigieng lagoon lies within the low sandhills extending eastward of Atjeh rivier, its entrance being about 4½ miles east-north-eastward. It is very shallow, but admits fairly large boats.

Two 6½-fathom (11^m9) patches lie about 2¼ miles north-north-westward and 1¾ miles northward, respectively, of the entrance to Gigieng lagoon.

Malacca passage.—Light.—Malacca passage separates Wé from the northern coast of Sumatra, and is the best approach to Oeleë Lheuë from northward.

Boero (Buro), a rocky islet, consists of a mass of rock and coral, with a few coconut palms on it, lying on the southern side of the fairway, about 3½ miles north-westward of Pedro punt (*Lat. 5° 40′ N., Long. 95° 26′ E.*). It is fringed by a reef with rocks above water, on which the sea usually breaks. The tidal streams set strongly over the fringing reef. A landing may be effected on the eastern and south-western sides of the islet.

A light is exhibited, at an elevation of 59 feet (18^m0), from a white iron framework structure, 46 feet (14^m0) in height, on Boero.

Anchorage.—Anchorage may be obtained, in a depth of 6 fathoms (11^m0), sand, about three-quarters of a cable eastward, or in a depth of from 8 to 9 fathoms (14^m6 to 16^m5), 2 cables south-westward of the light structure.

Coast.—Pedro punt, the northernmost point of Sumatra, is low, and may be identified by a group of casuarina trees not far from the beach. The appearance of the coast changes here; westward of the point it is flat, but eastward it is in places hilly right down to the coast. Close westward of the point is the entrance to a shallow lagoon, generally marked by surf, and which dries.

Chart 2777.

From Pedro punt to Ujong Pidië, 28 miles east-south-eastward, the hills approach the coast nearly the whole distance, and the flat swampy land only attains to any considerable width on the western and southern sides of Krueng Raja (Rayal) baai (page 55). Parts of the coast are composed of chalk or sandstone, and are steep, as at Ujong Bateë Poeteh, Ujong Mata Ië and Ujong Pidië; elsewhere it consists of sloping sandy soil, and is partly wooded.

There are several unimportant rivulets, but most of the entrances to them are closed during a prolonged drought. The most important is the Krueng Raja, which flows into the bay of the same name. Small villages stand at the mouths of the rivulets. The vicinity of Krueng Raja baai is densely populated, but farther eastward there are fewer inhabitants. The 6-fathom (11^m0) line is more than half a mile off Pedro punt, but farther eastward, more especially eastward of Kuala Ië Mameh, which dries in its entrance, about 1½ miles south-eastward of Ujong Bateë Poeteh, the coast is steep-to.

Except for the 5½-fathom (10^m1) patch in Krueng Raja baai there are no dangers beyond half a mile offshore.

Anchorage.—Directions.—Vessels should not anchor in a depth

Charts 2760, 830, 70, 748b.

Chart 2777.

of less than 8 fathoms ($14^{m}6$); the bottom is mostly rocky, especially off the headlands.

The bank fronting the coast within the 100-fathom ($182^{m}9$) line is fairly steep-to, with westerly and variable currents outside its limits; calms are more prevalent in the offing than nearer the land.

Tidal streams.—The tidal streams near the coast are regular, but the west-going stream, being in the same direction as the current, is much the stronger of the two.

Chart 3870, plan of Krueng Raya bay.

Krueng Raja baai.—Danger.—Krueng Raja (Krueng Raya) baai is entered between Ujong Kareuëng (Karöeng), situated about 1¼ miles east-south-eastward of Pedro punt, and Ujong Batu Kapal, a high rocky point about 5 miles farther south-eastward. Krueng Raja flows into the south-eastern part of the bay, with the village of the same name, on the eastern side of its mouth; the entrance to the river dries.

The western and southern sides of the bay are marshy, but eastward of the river the shore is a precipitous cliff. Kapal (*Lat.* 5° 37′ *N.*, *Long.* 95° 32′ *E.*), a high sandstone rock, which appears from a distance as a prau under sail, lies about 2 cables northward of Ujong Batu Kapal, with a depth of 2¾ fathoms ($5^{m}0$) in the fairway between. The shores of the bay are fringed by a bank extending about 2 cables, and there is a 4¾-fathom ($8^{m}7$) patch lying about 3 cables west-north-westward of Ujong Batu Kapal. There are two noticeable white cliffs near this point, being the only cliffs in this vicinity.

A coral patch, with a depth of 5½ fathoms ($10^{m}1$), and steep-to, lies about 1¼ miles offshore about 2¼ miles north-westward of Ujong Batu Kapal. It affords good temporary anchorage.

Anchorages.—The bay is inconveniently deep for anchorage, and on the western side the bottom is foul, but it is the only anchorage on the northern coast that is usually free from swell in both monsoons. The best position is at the head of the bay, in a depth of 17 fathoms ($31^{m}1$), about 3 cables offshore. There is also good anchorage, in a depth of 6 fathoms ($11^{m}0$), eastward of Kapal, with the southern extremity of Kapal in line with Boero (chart 3869), bearing about 296°.

Chart 2777.

Coast.—Ujong Bateë Poeteh, about 5 miles eastward of Ujong Batu Kapal, is formed of chalk and sandstone, falls steeply to the sea, and is easily identified by a large white patch showing against the green land and by a white grave.

Lam Panaih village, surrounded by coconut palms, is situated about 4½ miles south-eastward of Ujong Bateë Poeteh; there is a long row of trees eastward of it, and about 6 miles farther is Ujong Mata Ië, a high point.

About 3¾ miles south-eastward of Ujong Mata Ië is Blang Raja village, off which, within the 3-fathom ($5^{m}5$) line, are three detached rocks, with a depth of about 2 feet ($0^{m}6$), on which the sea always breaks; a group of casuarina trees and a few houses stand in the vicinity. The 6-fathom ($11^{m}0$) line is steep-to along this coast. Landing may be effected on the eastern side of Blang Raja.

Ujong Pidië, 4 miles south-eastward of Blang Raja, is the extremity of a range of hills sloping steeply to the sea, and is easily identified. A coral reef extends half a cable from the point and is steep-to. About

Charts 2760, 830, 70, 748b.

Chart 2777.

2 miles north-westward of the point is a lagoon, on the south-eastern side of which stands Laweuëng village.

From Ujong Pidië to Ujong Radja (Raja), 38 miles east-south-eastward, the coast consists of a narrow strip of sand covered by brushwood with here and there groups of trees. Small fishing villages are scattered along this coast, and within it the ground is swampy, but not far inland it becomes undulating, and is cultivated, fertile, and thickly populated.

Krueng Baro, which flows out 8½ miles south-eastward of Ujong Pidië, is the principal river on this part of the coast, and between it and Kuala Ndjong (Njong), about 11½ miles farther south-eastward, and from half a mile to one mile inland, is a series of dense coconut forests, seaward of which the land is comparatively bare. Between Kuala Ndjong and Kuala Pante Radja (Raja), about 1¼ miles eastward, and at Triëng Gadeng, 2¾ miles farther east-south-eastward, the hills approach the coast. Near Pante Radja, and on either side of Kuala Ndjong, are three clumps of high trees.

Triëng Gadeng (*Lat. 5° 16′ N., Long. 96° 11′ E.*), a very steep hill, 280 feet (85^{m}3) high, rises immediately over the beach, and may be identified by a single tree on its summit. There are two noticeable villages near it. Eastward of Ujong Meureudoe (Mörödu), about 4½ miles eastward of Triëng Gadeng, the coconut palms again approach the coast, and farther eastward merge with the low forest land in which Samalanga village is situated. About 4½ miles south-south-westward of Ujong Radja is Banggalang, 946 feet (288^{m}3) high, which has a fairly flat top and a light green patch on its north-western slope.

Landmarks are scarce along this coast, but there are no dangers outside a distance of half a mile offshore.

About 4½ miles south-south-eastward of Ujong Pidië is Kuala Bateë, and 2 miles farther south-eastward is Kuala Banggalang, which has a depth of 3 feet (0^{m}9) in its rather wide entrance. It has several trees on its south-eastern bank, one standing much higher than the others, and two on its north-western bank, which render it easy to identify.

Sigli.—Light.—Sigli, the headquarters of an Administrator, is situated at the mouth of a river which flows out about 8½ miles south-eastward of Ujong Pidië. It is visible some distance seaward, as the coastal vegetation in the vicinity is kept cleared, and there is a small clump of high casuarina trees on the beach. There are two entrances to the river, the north-western of which dries. The south-eastern entrance has a depth of about 2 feet (0^{m}6), and is marked by stakes, but the channel is continually changing in depth and direction.

About 2 miles above the entrance the river is only navigable by canoes. The land is very fertile and thickly populated.

A light is exhibited, at an elevation of 46 feet (14^{m}0), from a flagstaff at Sigli.

Good, but open anchorage, may be obtained, in depths of from 7 to 8 fathoms (12^{m}8 to 14^{m}6), mud, about three-quarters of a mile offshore, off Sigli, with Ujong Pidië bearing 323° and the flagstaff, 243°.

There is a wooden jetty, equipped with a crane, with a lifting capacity of about one ton, on the western bank of the south-eastern entrance of the river.

Fresh provisions and water may be obtained.

Charts 2760, 830, 70, 748b.

Chart 2777.

There is regular steamer communication.

Sigli is connected by steam tramway to the railway on the east coast of the island.

Tidal streams.—The tidal streams set eastward and westward, but the former is usually overcome by the westerly current.

Coast.—About 3½ miles south-eastward of Sigli is Kuala Gigieng, with a village on the north-western side of its entrance, and Gigieng village about 2 miles up the river. About 2¾ miles south-eastward of Kuala Gigieng, is Kuala Ië Leubeuë (Löböe), the mouth of Krueng Tiro; its entrance may be identified by a few coconut palms a short distance eastward of it, and a portion of the coast near it appears from the offing as a long, sandy, bare promontory.

Anchorage may be obtained off Kuala Ië Leubeuë, in depths of from 8 to 10 fathoms ($14^{m}6$ to $18^{m}3$), but the coast is steep-to eastward of it.

Kuala Ndjong (*Lat. 5° 17′ N., Long. 96° 07′ E.*), which is the mouth of Krueng Teupin Raja (Topin Raya), has a depth of about 3 feet ($0^{m}9$). The river trends about 2 miles westward from its mouth parallel with the coast and thence trends south-westward; Poesong (Pusong) village is situated on the coast at the bend. The western bank of the river is sandy and thickly overgrown with brushwood. A row of high trees standing near the beach westward of the entrance and eastward a ridge of hills, covered by pepper plantations, reaches nearly to the coast.

Anchorage may be obtained, in a depth of 8 fathoms ($14^{m}6$), off Kuala Ndjong, with the western side of the ridge of hills in line with two trees at the river mouth.

Ujong Meureudoe is low and sandy, with a few small trees on it. A rivulet resembling at a distance a path in the valley, is prominent during the rainy season. A grove of trees stands 1½ miles westward of the point. Meureudoe (Mörödu) village stands on the banks of the rivulet of the same name, about 3¼ cables from its mouth; up to this point its banks are marshy, with mangroves and nipa palms. Eastward of the rivulet the coast is covered with coconut palms, which continue along the coast to Kuala Oelim (Ulim), nearly 3 miles east-south-eastward. Meureudoe is connected to the railway on the east coast by a steam tramway.

The 6-fathom ($11^{m}0$) line passes about one mile from Ujong Meureudoe and is steep-to.

Krueng Oelim, which flows out 2¼ miles east-south-eastward of Ujong Meureudoe, makes a considerable break in the coconut palms, being half a cable wide at its entrance, and therefore is easily identified. It has usually two entrance channels which are constantly changing.

Krueng Samalanga, which flows out about 5 miles east-south-eastward of Krueng Oelim, is about a quarter of a cable wide as far as Samalanga village, one mile inside the entrance; its water is fresh almost to its mouth. The outlets of the lagoon eastward of Samalanga dry. Heavy seas prevail off the entrance during the North-east monsoon.

Anchorage may be obtained off the mouth of Krueng Samalanga, in depths of from 12 to 15 fathoms ($21^{m}9$ to $27^{m}4$), about one mile offshore, but during the North-east monsoon the anchorage is untenable at times.

Ujong Radja (Raja) is a low promontory, which may be identified

Charts 2760, 830, 70, 748b.

Chart 2777.

at a distance by a grove of high trees near its extremity. There is a depth of 5 fathoms ($9^{m}1$) close off it, but it should not be approached within a depth of less than 8 fathoms ($14^{m}6$), or within half a mile. Some red rocks lie one mile south-eastward of the point.

Off-lying danger.—A shoal, with a depth of 4¾ fathoms ($8^{m}7$), lies about 2¾ miles eastward of Ujong Radja, and 2 miles offshore. The 6-fathom ($11^{m}0$) line passes about one mile offshore between Ujong Radja and the mouth of Krueng Peudada (Pödada), 7¼ miles east-south-eastward.

Coast.—Danger.—The coast between Ujong Radja (*Lat. 5° 14′ N., Long. 96° 28′ E.*) and Kuala Geukoeëh (Gökueh), about 35 miles eastward, is low, sandy and wooded, with higher land close within it. Between Ujong Radja and Ujong Peusangan (Pösangan), 22 miles eastward, the low stretch of plain is covered with stretches of grass, interspersed by groves of trees. There is a row of high trees on either side of Kuala Geukoeëh, giving the land the appearance of a promontory; the marshy land traversed by lagoons which lie within the coast is only a narrow strip.

Gle Ran, 1,278 feet ($389^{m}5$) high, 4 miles southward of the entrance to Krueng Peudada, is steep on its eastern side, and can best be seen from north-westward, from which direction it appears as a large square horn with steep sides.

Gle Mongmong, 739 feet ($225^{m}3$) high, with a thicket on its summit, lies 10½ miles eastward of Gle Ran, and 5½ miles from the coast, and is easy to identify.

There are many villages along this coast, but good landmarks are scarce; the promontories are all low and not so sharply defined as those westward of Ujong Radja.

Krueng Peudada is navigable for boats at high water, and the village of the same name stands on its eastern bank, about one mile from its entrance. The entrance is difficult to distinguish from the offing, but it is marked by a patch of jungle. Kuala Djeumpa (Jömpa) with the village of the same name, lies about 3¾ miles eastward of the mouth of Krueng Peudada. The 6-fathom ($11^{m}0$) line, which passes about one mile from the coast in this vicinity, is steep-to, but within it the depths are shallow and irregular.

Gle Banggalang, bearing 250°, well open of the mouth of Krueng Peudada, leads seaward of the coastal bank in this vicinity.

Kuala Radja (Raja), 5½ miles east-north-eastward of Kuala Djeumpa, can be entered by boats at high water. A bank, over which the sea breaks, lies on the eastern side of the mouth, and a village, noticeable from seaward, stands on the western bank of the river at the entrance. The coast is low here, and the 6-fathom ($11^{m}0$) line passes about half a mile off.

Ujong Peusangan is low and sandy, and may be identified by a few casuarina trees close eastward of it. The 6-fathom ($11^{m}0$) line lies about 3 cables offshore, and outside it the depths increase rapidly to 30 fathoms ($54^{m}9$) at one mile distant. Between Ujong Peusangan and Kuala Geukoeëh the 6-fathom ($11^{m}0$) line lies as much as 1¼ miles offshore, decreasing to a quarter of a mile at the latter point, and is steep-to. This stretch of coast should not be approached within the 10-fathom ($18^{m}3$) line; the bottom is mostly hard sand and small stones, with coral in places, and the holding ground is indifferent.

Charts 2760, 830, 70, 748b.

Chart 2777.

Kuala Tjeurape (Chörape) is the mouth of Krueng Peusangan (Pösangan); the lower reach of this river is called Krueng Blang Mé. Anchorage may be obtained off Kuala Tjeurape, in a depth of 6 fathoms ($11^{m}0$), but there are dangerous sandbanks off the entrance. Kuala Mane, the mouth of Krueng Sawang, lies about 5 miles east-south-eastward of Ujong Peusangan.

Agam Agam is a reef, with a depth of 7 feet ($2^{m}1$), lying about 6 cables offshore, 7½ miles eastward of Ujong Peusangan (*Lat. 5° 16′ N., Long. 96° 50′ E.*).

Good anchorage may be obtained in the bight between Ujong Peusangan and Agam Agam, in depths of from 5 to 7 fathoms ($9^{m}1$ to $12^{m}8$).

The coast southward of Agam Agam is low and overgrown with vegetation, and is devoid of landmarks. Kuala Geukoeëh may be identified by groups of dark-coloured casuarina trees standing on either side of it. On the western bank are some sandhills about 24 feet ($7^{m}3$) high, whilst the opposite bank is covered with thick brushwood and in some places dense jungle. Shallow passages lead through the lagoons from abreast the village situated about one mile from the entrance to Kuala Boengkaih (Bungkaih), about 4 miles westward, and to Lho Seumawe (Sömawe), about 7½ miles south-eastward.

Between Kuala Geukoeëh and Diamond point, 27 miles eastward, the coast is sandy, backed by a narrow strip of swampy forest land, about one mile within which it becomes hilly. The hilly range, which trends south-eastward, begins at Panggoj (Panggoy), a hill, 4 miles north-westward of Lho Seumawe; this hill may be identified by a solitary tree on its summit; southward of Lho Seumawe the hills recede from the coast in a south-easterly direction, and the extensive plain begins, which is widest at Diamond point, and extends all along the east coast of Sumatra. Krueng Keureutoë (Körötoë) and Sungei Djambo Aje (Jambo Aye), which, with their tributaries, irrigate a wide tract of land, enter the sea on this coast. Several groups of trees near the coast are good landmarks.

Kuala Mamplan, 5½ miles east-south-eastward of Kuala Geukoeëh, has a depth of one foot ($0^{m}3$), with 2 fathoms ($3^{m}7$) in places inside. Its banks are swampy, with villages here and there. It is connected with Kuala Geukoeëh and Lho Seumawe by swampy and shallow passages, available only for canoes.

Ujong Hago, one mile south-eastward of Kuala Mamplam, is a sandy promontory, easily identified by the high trees just within it, and is steep-to.

Chart 3870, plan of Lho Sömawe road.

Reede Lho Seumawe.—Light.—Reede Lho Seumawe (Sömawe) is situated off the town of Lho Seumawe. The limits of the roadstead, which extends about 11 cables seaward, are imaginary lines drawn in an 090° direction through the boundary mark close northward of the town and the extremity of the point about 9 cables southward of the pier.

A light is exhibited, at an elevation of 19 feet ($5^{m}8$), from the pier-head at Lho Seumawe.

Anchorage.—Excepting Krueng Raja baai (page 55) this is the only anchorage on the north coast of Sumatra affording protection from the open sea. It is well sheltered during the South-west monsoon, but it is confined, and the depths increase rapidly offshore. At times

Charts 2760, 830, 70, 748b.

Chart 3870, plan of Lho Sömawe road.

during the North-east monsoon fresh breezes blowing against the tidal stream cause a nasty sea. The best anchorage is in a depth of 9 fathoms ($16^{m}5$), mud, with the pier bearing 280°.

Tidal streams.—The tidal streams in the vicinity of Lho Seumawe are weak, and are affected by the westerly current along the coast.

Town.—The town of Lho Seumawe, is the headquarters of an Administrator, and is an important trading station. It may be easily identified by a remarkable ridge of hills, 500 feet ($152^{m}4$) high, which is cleared of trees, and showing light green grass which makes it conspicuous.

There is a pier at the southern end of the town ; it is connected by a steam tramway to the general railway system, and is available only for small craft. There is a crane on the pier-head. Loading and discharging cargo alongside is difficult at times.

Fresh provisions may be obtained.

There is regular steamer communication.

Chart 2777.

Coast.—Between Lho Seumawe and Diamond point (*Lat. 5° 15′ N., Long. 97° 30′ E.*) the coast is fringed by a sandbank, with depths of less than 3 fathoms ($5^{m}5$), extending about one mile offshore, except off Kuala Tjankoj (Changkoy), 9½ miles eastward of Lho Seumawe, where it extends about 2½ miles ; there are several coral patches farther offshore, which are described on page 61.

In 1945, it was reported that within 3 miles of the coast, between Lho Seumawe and Diamond point, there were numerous bamboo poles, marking fish pots, which should be avoided, as they are secured by long lengths of rope.

Kuala Meurasa (Mörasa) lies 1½ miles southward of the pier at Lho Seumawe. Meurasa village stands on the eastern bank near its entrance. Kuala Pase, 4½ miles eastward of Kuala Meurasa, has a very shallow entrance, and may be identified by two high trees. Gedong village, about 2 miles up the river, is connected by a steam tramway to the railway system ; small craft can reach the village at high water, but the channel is tortuous.

Krueng Keureutoë, which flows out about 3 miles eastward of Kuala Pase, is a rapid fresh-water river, and its mouth, which is three-quarters of a cable wide, is easily identified by two high trees westward of it ; here the banks are low and covered with brushwood, but farther up they are higher. About 4 miles up is the village of Keureutoë. For a distance of 7 miles from its entrance the width of the river is not less than half a cable. The country in the vicinity is thickly populated and the land cultivated.

Good anchorage may be obtained off the mouth of Krueng Keureutoë, in a depth of 6 fathoms ($11^{m}0$), with the two high trees bearing 188°.

Kuala Tjangkoj, 3 miles east-north-eastward of Kuala Keureutoë, is marked by trees. Krueng Piada, entered nearly one mile eastward of Kuala Tjangkoj, may be identified by a noticeable grove of trees close to it. There are depths of from 3 to 4 fathoms ($5^{m}5$ to $7^{m}3$) in the river, between banks of mangroves.

Off-lying dangers.—Buoy.—Gatoei (Gatui), a shoal, with a depth of 2 fathoms ($3^{m}7$), lies 2¼ miles north-westward of the entrance to Kuala Tjangkoj. Panggoei (Panggui), a shoal, with a depth of 2¾ fathoms ($5^{m}0$), lies nearly half a mile northward of Gatoei.

Charts 2760, 830, 70, 748b.

Chart 2777.

Timau, a shoal, with a depth of 5 feet ($1^{m}5$), lies 6¼ miles westward of Diamond point and about 2¾ miles offshore. It is marked on its northern side by a black and white chequered conical buoy, surmounted by a ball.

Karang Tengah, a coral reef, over which there is a depth of 4 fathoms ($7^{m}3$), lies about 2¾ miles north-westward of Timau, and 2 miles farther north-north-westward is Karang Minjak (Minyak), a bank with a depth of 9 fathoms ($16^{m}5$).

Under favourable circumstances these shoals are marked by tide-rips. Vessels rounding Diamond point and bound for Lho Seumawe should give them a wide berth; small craft may, however, pass between Timau and the coast, thence well northward of Gatoei.

Coast.—The bottom between these dangers and the coast is sand close to the coast, and sand, mud, and coral a short distance off, whilst in the offing it is clay and mud.

Sungei Djambo Aje (Karang Jambo Aye) enters the sea about one mile west-south-westward of Diamond point, and separates the province of Keureutoë from that of Simpang Olim. The bar usually breaks at low water, and is subject to change. Navigation is difficult on account of the tortuous channel and strong current. Discoloured water from the rivers sometimes extends 4 miles from its mouth.

The river is not much used by the natives for trade purposes, owing chiefly to its shifting and dangerous bar. Produce is generally taken through an artificial canal to the Simpang Olim for shipment.

Diamond point (*Lat. 5° 15′ N., Long. 97° 30′ E.*), called by the Dutch Diamant punt, is a sandy point just above high water, within which are a few casuarina trees. The coastline appears to be slowly receding.

A spit, with depths of less than 3 fathoms ($5^{m}5$), extends about 2¾ miles north-westward from Diamond point; it is somewhat steep-to on its north-eastern side, over which the sea breaks in places. Discoloured water has been reported about 2¼ miles northward of the light structure, and vessels should not approach the spit inside the 10-fathom ($18^{m}3$) line, especially during the North-east monsoon, when there is a heavy swell.

Charts 1353, 2777.

Light.—A light is exhibited, at an elevation of 84 feet ($25^{m}6$), from a brown framework structure on a white octagonal base with black bands, 79 feet ($24^{m}1$) in height, about 1½ miles north-north-westward of Diamond point.

Chart 2777.

Tidal streams.—The tidal streams set south-eastward and north-westward. The north-west-going stream, being increased by the prevailing north-westerly current, is stronger and of longer duration than the south-east-going stream, and at springs sometimes attains a rate of 3 knots, but in the offing it seldom exceeds 1½ knots.

Near the coast westward of Diamond point the tidal streams are weak.

DIRECTIONS FOR NORTH COAST OF SUMATRA.—The north coast of Sumatra can almost everywhere be approached to a depth of 12 fathoms ($21^{m}9$), since all dangers lie within that limit. The only exceptions are the dangers westward of Diamond point and the 5½-fathom ($10^{m}1$) patch in Kroeëng Raja baai.

Charts 1355, 2760, 830, 70, 748b.

CHAPTER III

MALACCA STRAIT, WESTERN SHORE—DIAMOND POINT TO THE KARIMOEN EILANDEN IN THE WESTERN APPROACH TO SINGAPORE STRAIT

Chart 1353.

EAST COAST OF SUMATRA.—Aspect.—The land between Diamond point (*Lat. 5° 15′ N., Long. 97° 30′ E.*) and Ujong Tamiang, 69 miles south-eastward, is an alluvial plain, low and marshy, with few conspicuous features. From February to May, inclusive, the higher mountains are only occasionally faintly visible, but during the remainder of the year they can usually be seen, especially in the morning.

Chart 2777.

Semboeang gebergte (Sembuang), the summit of which is 6,657 feet (2029^{m}1) high, lies about 35 miles westward of the head of Langsa baai (page 65) but it has no distinctive peak. Oentoeng (Untung), about 14 miles southward of the above-mentioned summit, is 6,903 feet (2104^{m}1) high, and is dome-shaped. Moegadjah (Mugayah), about 10 miles farther southward, is 10,102 feet (3079^{m}1) high, with a sharp peak, which is visible from off the north coast of Sumatra. Between these mountains and the head of Langsa baai is Bandahara, 3,750 feet (1143^{m}0) high, situated about 17 miles eastward of Oentoeng; it lies at the north-western end of a range which has a level ridge with a small peak in the middle, and is visible from off Diamond point; Mesdjid (Mesjid), with two peaks, the higher of which has an elevation of 3,113 feet (949^{m}2), lies about 14 miles south-south-eastward of Bandahara. The hills north-eastward of the line joining Bandahara and Mesdjid, although low, are fairly identifiable; these include Bukit Lengkok Keris and Bukit Langkahan, Tamiang, 391 feet (119^{m}2) high, and Platte Heuvel (chart 1353), 505 feet (153^{m}9) high, situated 12½ miles east-south-eastward of Tamiang.

Local weather.—*See* page 26.

Rivers.—Several small rivers flow out on this coast, the principal of which are the Simpang Olim, Ara Koendoë (Kundoë), Idi, Peureula (Pöröla), Langsa, and Tamiang.

Charts 2777, 1353.

Tidal streams.—The tidal streams in the offing are largely affected by the wind, but the north-westerly set is the prevailing one. Nearer the coast the streams set south-eastward and north-westward, at

Charts 2760, 830, 70, 748b.

Charts 2777, 1353.

a rate of about 1¾ knots, and close inshore about 2 knots; in the mouths of the rivers the stream runs at times at a rate of about 3 knots, but depends on the width of the entrances.

Coast.—Between Diamond point and Steile hoek, 12 miles south-eastward, there are casuarina trees interspersed by wide, but shallow mouths of several rivers and creeks; the principal of these are Sungei Roesa (Rusa), about 6½ miles south-eastward of Diamond point, and Simpang Olim, about 2½ miles farther south-eastward. From the northern side of the mouth of the former, a narrow sandy spit, on which there are some casuarina trees, extends about one mile south-eastward; between this spit and the coast south-westward of it are two islets. The approach to Sungei Roesa is difficult, and the channel in both rivers is liable to change.

A sand and mud bank, which dries in places, with depths of less than 3 fathoms (5^{m}5), extends from a quarter of a mile to 1½ miles offshore between Diamond point and Steile hoek.

Steile hoek is low, but the dense wood of casuarina trees on it gives it a high and steep appearance. Simpang Olim and Ara Koendoë the latter of which discharges on the southern side of Steile hoek, have the deepest approaches of any rivers on this stretch of coast. The former is connected to Sungei Djambo Aje (page 61), and for 6 miles from its mouth its course as far as the village of Simpang Olim, is liable to change.

The mouths of all the rivers between Diamond point (*Lat.* 5° *15′ N., Long.* 97° *30′ E.*) and Langsa baai, about 50 miles south-eastward, are difficult to approach, and have constantly shifting channels, which are sometimes indicated by tree-trunks, and require local knowledge to enter them. Between Diamond point and Steile hoek, during the north-west-going stream, there is a distinct division between the muddy water from the rivers and the clearer water of Malacca strait, extending out to the 20-fathom (36^{m}6) line.

Idi.—**Light.**—The village of Idi stands on the right bank at the mouth of Krueng Idi, which discharges 12½ miles south-eastward of Steile hoek. It is approached by two channels through the mud bank, of which the southern is the deeper; these channels are subject to continual change, and are marked with stakes. Inside the mouth the river is used as a prau harbour.

Idi is the headquarters of an Administrator.

Fresh provisions are obtainable.

Anchorages.—Anchorage may be obtained, in a depth of 5 fathoms (9^{m}1), with some huts on the south-eastern side of the river entrance bearing 236°, or in a depth of about 4 fathoms (7^{m}3), with the entrance bearing 224° and Ujong Peureula, 131°, but vessels generally do not ride comfortably, and during the North-east monsoon they are frequently unable to communicate with the shore.

A light is exhibited, at an elevation of 62 feet (18^{m}9), from a white iron framework structure, 69 feet (21^{m}0) in height, on the north-western side of the river entrance.

Communication.—There is regular steamer communication between Simpang Olim, Idi, and other ports in Sumatra. Idi is on the main railway line of the east coast.

Coast.—Ujong Peureula (Pöröla), 8½ miles south-eastward of Idi, is a low and sandy point covered with high trees, which, with Bukit

Charts 1355, 2760, 830, 70, 748b.

Charts 2777, 1353.

Brangkat, 427 feet ($130^{m}1$) high, about 4 miles west-south-westward, make it easy to identify.

Bank.—Buoys.—Bank van Peureula (Pöröla bank), with depths of less than 3 fathoms ($5^{m}5$), extends 4 miles northward and about 1½ miles eastward from Ujong Peureula. Close northward of the point there is a patch which dries, and about 1¼ miles northward there is a 2-foot ($0^{m}6$) patch. The sea nearly always breaks over the bank.

The northern edge of the bank is marked by a conical buoy, painted in black and white chequers, surmounted by a ball, and the eastern edge by a conical buoy, painted in red and black chequers, surmounted by a ball.

Coast.—Krueng Peureula discharges close westward of Ujong Peureula, and is approached over Bank van Peureula. In the channel at its mouth there is a depth of about 2 feet ($0^{m}6$), but inside, where the river is from about 130 to 200 feet ($39^{m}6$ to $61^{m}0$) wide, there is a depth of about 11 feet ($3^{m}4$). The large village of Peureula, near which the railway from Idi crosses the river, stands about 5 miles southward of the entrance. Boats can reach Peureula from the sea through Kuala Leugo Rajeu (Lögö Rayö), about 7½ miles southward of Ujong Peureula; its mouth, which dries, can be identified by two solitary tall trees standing about half a mile northward of it.

It is advisable to anchor as near as possible to the river mouth, standing in on a westerly course for Ujong Peureula.

The coast between Ujong Peureula (*Lat. 4° 54′ N., Long. 97° 54′ E.*) and Ujong Tamiang is uniformly low, covered with fairly high trees, and intersected by many unimportant creeks; about midway between is Langsa baai. A strip of sand borders it for the whole distance, with mangroves growing in the morass behind it, and in places there are shallow lagoons between the morass and the sand; except for a few fishing stations the coast is almost uninhabited.

The coast is fringed by a mudbank, with depths of less than 3 fathoms ($5^{m}5$), which extends from one to 2 miles offshore, and from Ujong Perolin, where the bank is steep-to, about 18½ miles south-south-eastward of Ujong Peureula, it extends about 3¾ miles offshore. *See* view facing this page.

About 3 miles southward of Ujong Peureula is the village of Boega (Buga), situated on the left bank of Sungei Boega, and on the southern side of the entrance to this creek is a white house which is easy to identify. Both Krueng Djeungki (Jöngki) and Sungei Raja (Raya), which discharge 9½ miles and 13 miles, respectively, south-south-eastward of Ujong Peureula, are navigable for boats.

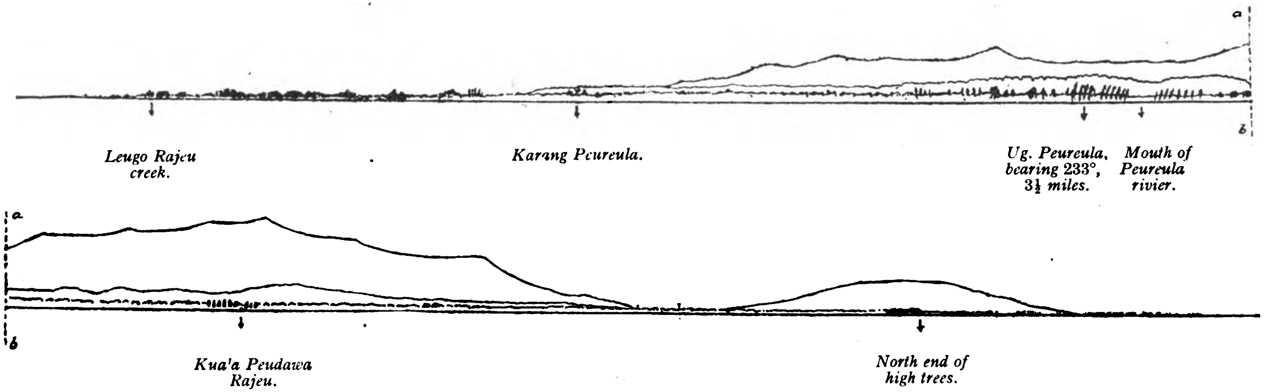
Chart 3574, plan of Langsa bay.

Between the mouth of Sungei Raja and Kuala Bajeuën (Bayöen), about 3½ miles south-south-eastward, there are no prominent objects, except a group of three low casuarina trees standing about 1½ miles north-westward of Kuala Bajeuën. A shoal, which dries, extends from half a mile to one mile offshore between the mouths of these two rivers.

Kuala Bajeuën, approached from northward, is entered between Pulau Perolin and the main island, and is navigable for vessels with a draught of 8 feet ($2^{m}4$). The main railway line crosses its tributary, Simpang Aneuh (Anöh), near Ranto Pandjang village. The tidal streams are felt as far as the railway bridge. Anchorage may be obtained off the railway station.

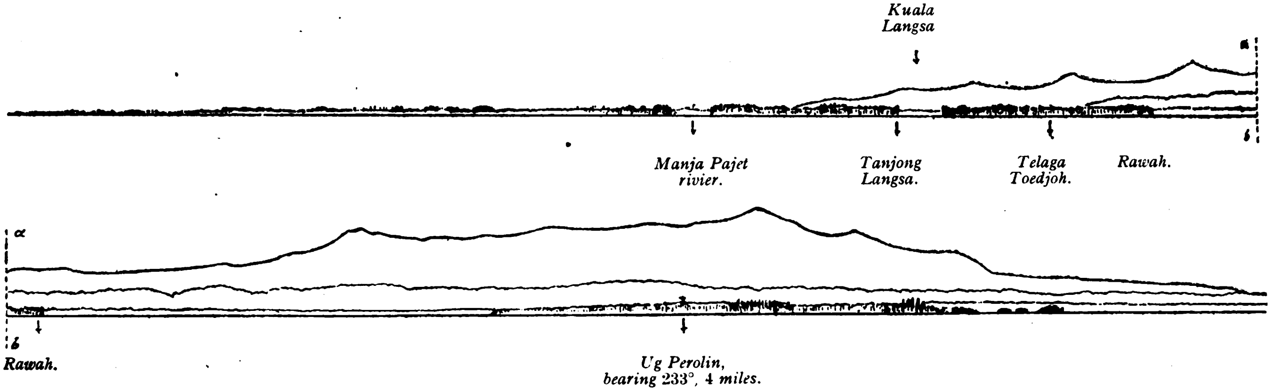
Charts 1355, 2760, 830, 70, 748b.

To face page 64.


a
b
Leugo Rajeu creek.
Karang Peureula.
Ug. Peureula, bearing 233°, 3½ miles.
Mouth of Peureula rivier.
a
b
Kua'a Peudawa Rajeu.
North end of high trees.

View, in two parts, of eastern approach to Idi.

(*Original dated* 1929.)



View, in two parts, of northern approach to Langsa baai.

(*Original dated* 1929.)

Chart 3574, plan of Langsa bay.

The reach of the Bajeuën above its confluence with the Simpang Aneuh, is narrow and difficult to navigate, there being numerous tree trunks in it.

Buoys.—A conical buoy, painted in red and black stripes, surmounted by a staff and ball, is moored 3¾ miles north-north-eastward of Ujong Perolin.

A white conical buoy marks the channel into the river, about 1¼ miles north-north-eastward of the northern extremity of Pulau Perolin, but it is unreliable.

Langsa baai.—Langsa baai, entered between Ujong Perolin, the eastern extremity of Pulau Perolin, and Tanjong Langsa, 4½ miles south-eastward, is encumbered by numerous shoals, between which there are narrow boat channels leading to the various streams which flow into it. The bay is easily identified by the rising ground south-westward of it, against which Telaga Toedjoh (Tujoh), an islet covered with trees, 2¾ cables north-westward of Tanjong Langsa, stands out sharply.

Ujong Perolin is low, sandy, covered with casuarina trees, and easily identified.

Tanjong Langsa (*Lat. 4° 33′ N., Long. 98° 04′ E.*) is easy to identify from eastward; it is rendered conspicuous by its sandy beach and a group of casuarina trees south-eastward of it, extending to the mouth of Sungei Manja Pajet (Manya Payet), about 1½ miles south-eastward. *See* view facing page 64.

Mud flats, with depths of less than 3 fathoms ($5^{m}5$), extend about 2 miles north-eastward from Telaga Toedjoh, and a spit, which dries, extends about 8 cables east-north-eastward from the south-eastern end of the island, and another about 4 cables northward from the northern extremity.

Channels.—Depths.—Buoyage.—There are three channels into Langsa baai: Birem, leading from north-eastward to the mouth of Krueng Birem; and Telok Dalam and Kuala Langsa, leading to the port of Kuala Langsa, situated about 3½ miles south-westward of Tanjong Langsa.

Birem channel has a least depth of 13 feet ($4^{m}0$), and is marked on its south-eastern side by a black can buoy, situated about 1¼ miles south-south-eastward of Ujong Perolin.

Telok Dalam, the principal channel to Kualà Langsa, is approached from north-eastward and passes close along the western side of Telaga Toedjoh. In 1944, the depth over the outer bar of this channel was 14 feet ($4^{m}3$) and over the inner bar, off the south-western point of Telega Toedjoh, was 13 feet ($4^{m}0$).

Kuala Langsa channel, which passes on the south-eastern side of Telaga Toedjoh, has a depth of 4 feet ($1^{m}2$), and joins Telok Dalam channel southward of Telaga Toedjoh.

Four black can buoys mark the eastern side of Telok Dalam channel, and three white conical buoys mark the western side. Their positions may best be seen on the chart.

Tidal streams.—The tidal streams in Langsa baai generally follow the direction of the channels to and from the river mouths; they run strongly sometimes well outside the 6-fathom ($11^{m}0$) line, and with considerable strength in the river mouths.

Charts 1353, 1355, 2760, 748b.

Chart 3574, plan of Langsa bay.

Tidal signals.—Tidal signals are made from the flagstaff on the pier-head at Kuala Langsa as follows:—

Signal.	*Signification.*
A cylinder between two cones, the lower cone point down	Slack water.
A cone over a cylinder	Flood stream.
Two cones over a cylinder . . .	Strong flood stream.
A cylinder over a cone, point down . .	Ebb stream.
A cylinder over two cones, point down .	Strong ebb stream.

The signals *at night* consist of three reflectors on the flagstaff, disposed as follows:—

Horizontally	Slack water.
A triangle, point up . . .	Flood stream.
A triangle, point down . .	Ebb stream.

Regulations.—Vessels entering must not exceed a speed of 6 knots as far as the white buoy off the north-western extremity of Telaga Toedjoh, and vessels leaving must proceed as slowly as possible.

Vessels approaching a bend in the river must blow their whistle or ring a bell.

A stern anchor must always be in readiness.

Directions.—Approaching Langsa baai from northward, a good berth should be given to the mud bank which extends north-eastward from Ujong Perolin. When passing the drying spit extending from the north-western extremity of Telaga Toedjoh, the conical white buoy off the north-western extremity of Telaga Toedjoh should not be brought within the trees on Ujong Perolin. Rawah Rajeu (Rayö), nearly one mile south-westward of Telaga Toedjoh (*Lat.* 4° 34′ *N.*, *Long.* 98° 03′ *E.*), is difficult to distinguish, but Toedjoh Tikoih, an islet situated about 1¾ miles south-westward of the north-western extremity of Telaga Toedjoh, shows up well.

Krueng Birem.—Krueng Birem is formed by the confluence of Birem Rajeu (Rayö) and Birem Poentong (Puntong) rivieren, each of which is navigable for about 4 miles by craft drawing 6½ feet ($2^{m}0$). Birem Rajeu is narrow and tortuous, and Birem Poentong is wide and straight.

Kuala Langsa.—Kuala Langsa, situated on the left bank of Krueng Langsa, is the port of the town of Langsa, which stands higher up the river, and is the headquarters of an Administrator.

There is a pier, about 330 feet ($100^{m}6$) long, with a depth of about 5½ fathoms ($10^{m}1$) alongside, at Kuala Langsa, at which vessels load and discharge their cargo.

The limits of the roadstead are the meridian of the western extremity of Rawah Tjoet (Chut), situated close south-westward of Rawah Rajeu, and the parallel of the point on the left bank of the river situated about 4½ cables north-eastward of the pier.

There is regular steamer communication with other ports in Sumatra. Kuala Langsa is connected by steam tramway with Langsa, which is on the main railway line of the east coast.

Provisions may be obtained at Langsa.

There is a port medical officer.

Coast.—Light-buoy.—Beacons.—The village of Manja Pajet, about 5 miles up the river of the same name, is the only inhabited place in this district, and can be reached only by light craft.

Charts 1355, 2760, 748b.

Chart 1353.

Kuala Radja Moeda (Raja Muda), about 3¼ miles south-eastward of Tanjong Langsa, is easy to identify, as on the south-eastern side of the entrance the general mangrove vegetation is broken by a grove of casuarina trees. Kuala Roekoeë (Rukuë), about 2 miles east-south-eastward of Kuala Radja Moeda, has, near its eastern entrance point, a sparse, but very high casuarina wood, which is visible 20 miles from seaward.

Sungei Pante Keureuma (Kerma) and Sungei Telega Moekoe (Muku) discharge together into a wide basin, which dries, about 3 miles south-eastward of Kuala Roekoeë, the former from westward, the latter from southward. Sungei Telaga Moekoe is connected to Sungei Ijoe (*see* below) by a rivulet which is available for boats entering from seaward.

Tanjong Genteng (*Lat. 4° 27′ N., Long. 98° 14′ E.*) is the south-eastern extremity of a line of casuarina trees which extends 2 miles north-westward along the coast.

Two leading beacons, the front surmounted by a triangle, and the rear by an inverted triangle, are situated about 3½ cables north-westward of the extremity of Tanjong Genteng; in line, bearing 211°, they lead to the entrance of Sungei Ijoe.

Ujong Tamiang, about 4 miles south-eastward of Tanjong Genteng, may easily be identified from all directions by the groups of casuarina trees standing on either side of the mouth of Tamiang rivier, and which are visible from a considerable distance. From north-westward and south-eastward, the point at a distance appears as an islet.

A flat, which dries, extends about 6 cables northward and 2½ cables eastward from Ujong Tamiang; it is steep-to, with a depth of 20 fathoms ($36^{m}6$) within a cable of the 5-fathom ($9^{m}1$) line.

A light-buoy painted black, exhibiting a *white flashing* light *every seven seconds* (flash *three seconds*), is moored nearly three-quarters of a mile north-eastward of Ujong Tamiang.

Tamiang rivier, which flows out about half a mile westward of Ujong Tamiang, can only be entered through Sungei Ijoe, which discharges on the eastern side of Tanjong Genteng, and thence through Sungei Aloer Boengin, joining Tamiang rivier at Kelapa, about 5½ miles from its mouth. There is a depth of about 4½ feet ($1^{m}4$) on the bar of Sungei Ijoe. During January, February and March the sea often breaks on it.

Vessels drawing 6 feet ($1^{m}8$) can reach Oepak, 18 miles from the mouth. Under favourable conditions Kuala Simpang, a village about 15 miles above Seroewai, can be reached. A pilot should be taken, and one can be obtained from the village of Genteng, situated on Tanjong Genteng.

Kuala Simpang is the headquarters of an Administrator, and is connected to the main railway line of the east coast.

Directions.—Vessels should approach the entrance to Sungei Ijoe with the leading beacons, in line, bearing 211°, but local knowledge is necessary for entering the river. Care must be taken when approaching from north-westward or south-eastward, as the coastal bank is steep-to for 8 miles north-westward of Ujong Tamiang and for 3 miles southward of it.

Coast.—The coast between Ujong Tamiang and Tanjong Tandjoeng (Tanjung) (chart 1355), about 97 miles south-eastward, is low, thickly covered with vegetation, and consists entirely of an alluvial formation

Charts 1355, 2760, 748b.

Chart 1353.

intersected by numerous small rivers, few of which are navigable even for small craft.

In places it is intercepted by strips of sandy beach, on which casuarinas are always to be found; these are markedly distinguishable from the mangrove owing to their darker colour, greater heights, and their fine needle-like foliage; many of them may be seen from a distance of 20 miles in clear weather.

Where the mangrove grows, the ground is inundated, and the mangroves extend back many hundreds of yards; within them the ground is marshy in places, but mostly the land is firm with tall trees; these are rapidly disappearing owing to the increased tobacco cultivation on it.

The appearance of the coast is very monotonous, and it is not always easy to identify the locality in which a vessel may be without some local knowledge.

Landing on the coast, other than by making use of the river channels, is in no case advisable, and it is impracticable in the event of any sea or swell, which occurs particularly during the North-east monsoon. At high water, during calms, landing may be effected on the sandy beaches, but not where mangroves exist, as there the ground, if any, is all soft mud. In clear weather some low hills and the mountains inland referred to below, may be seen from the offing above the trees on the coast.

Chart 1355.

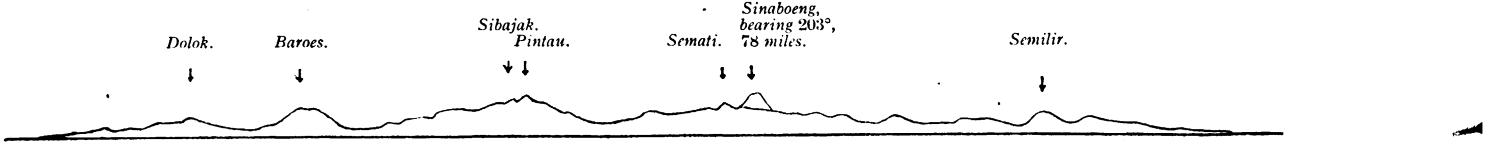
Aspect.—On approaching Aroe (Aru) baai, Platte Heuvel (*Lat. 4° 16′ N., Long. 98° 09′ E.*), about 6½ miles northward of the northern shore of the bay, may be identified. About 25 miles westward of Ujong Siata (page 69), is Langsa, 4,688 feet (1428^{m}9) high, and 3 miles farther westward, Pepandai (Pepandeih), 4,720 feet (1438^{m}7) high, both of which are clearly visible as spurs of the twin-peaked Segama, 6,426 and 6,492 feet (1958^{m}6 and 1978^{m}7) high, situated about 4½ miles south-eastward of Langsa. Badak, 6,394 feet (1948^{m}9) high, 1¾ miles south-eastward of Segama, appears rounded when seen from northward, but from eastward as a rounded cone. Gajo (Gaju), 6,098 feet (1858^{m}7) high, is a noticeable peak rising from the level range, nearly 3 miles south-eastward of Badak, and Ulu Besitang or Sangkapani, 6,125 feet (1866^{m}9) high, is a similar shaped peak situated about 4 miles farther south-eastward. Between the mountains mentioned above and the coast there are no conspicuous peaks. About 27 miles west-south-westward of Ulu Besitang is Kemiri (chart 2760), 10,954 feet (3338^{m}8) high, which is occasionally visible.

Between Ulu Besitang and Kemiri is Kembar, lying at the north-western end of the Wilhelmina keten, but it is not visible when approaching Aroe baai. About 9½ miles south-eastward of Kembar, and part of the same range, is Bandahara, 9,871 feet (3008^{m}7) high, easy to identify from north-eastward. Goeloe (Gulu), the south-easternmost peak of Wilhelmina keten, is 7,214 feet (2198^{m}9) high, and has a rather jagged outline.

Farther south-eastward is the Van Heutsz gebergte, which may be identified in clear weather. At the north-western end of the range, and situated about 50 miles southward of the head of Aroe baai, is Semilir, 5,902 feet (1798^{m}9) high, and of a uniformly round shape. Pintau, the highest point of the range, is 7,345 feet (2238^{m}7)

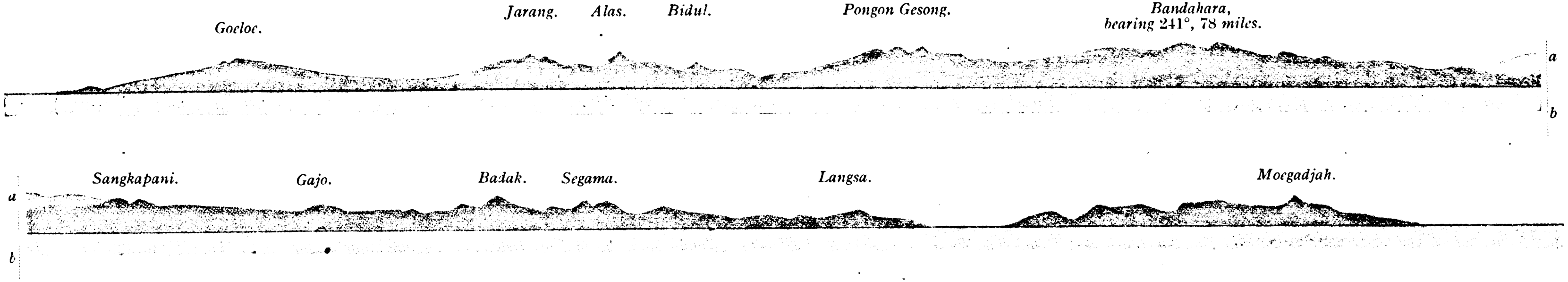
Charts 2760, 748b.

To face page 69.



Van Heutsz gebergte.

(*Original dated* 1929.)



View, in two parts, of mountains at north-western end of Sumatra.

(*Original dated* 1902.)

Chart 1355.

high, and lies 9½ miles east-south-eastward of Semilir; its summit appears as a flat-topped cone. Close southward of it, and about 450 feet (137^m2) lower, is Sibajak (Sebajak), a volcanic crater, with a bare broken rim. About 8 miles south-westward of Pintau is Sinaboeng or Djinaboeng (Jinabung), 8,034 feet (2448^m8) high, which shows up above the Van Heutsz gebergte from north-eastward; it is a cone-shaped volcano, from which steam is occasionally emitted. About 28 miles east-south-eastward of Pintau is Simbolon (Si Belem), 5,048 feet (1538^m6) high, and 2½ miles farther eastward, Simarito, 4,556 feet (1388^m7), which together form a solitary ridge having a serrated edge; the eastern side of this ridge slopes gradually to low land. *See* views facing this page.

Chart 3574, plan of Aru bay.

AROE BAAI. — Channels. — Light-vessel. — Buoyage. — Aroe (Aru) baai, entered between Ujong Tamiang and Tanjong Bedoekang (Bedukang), about 21 miles south-south-eastward, is fronted by mud flats, with depths of less than one fathom (1^m8), extending from 1½ to nearly 5 miles offshore. Two islands, Koempai (Kumpai) and Sembilan or Tampalis, lie on the northern and southern sides, respectively, of the bay; both islands are low, but have tall trees which are visible from a distance of about 16 miles. On the southern extremity of Koempai (*Lat. 4° 11′ N., Long. 98° 15′ E.*) is a settlement of the same name. At the head of the bay are several smaller islands, the principal of which are Pandjang, Talang, and Kera. Tanjong Bedoekang is difficult to identify.

Koempai channel leads into Sungei Besitang close south-eastward of the settlement of Koempai, and had, in 1934, a least depth of 10 feet (3^m0) at its entrance. This channel also leads into Troesan Serangdjaja (Trusan Serangjaya), on the south-western side of the island of Koempai, and into Sungei Salahadji at Ujong Siata, at the head of the bay.

The roadstead of Koempai lies between the meridian through the southern extremity of Koempai and a line joining the north-western extremity of Sembilan and the western entrance point of Troesan Serangdjaja.

Koempai channel is marked by a fairway buoy painted in red and black bands, situated about 8 miles north-eastward of Koempai light structure, and thence by white conical buoys on the starboard hand, and black can buoys on the port hand on entering.

Sembilan channel is the deepest and main channel, and leads to the oil-loading station at Pangkalan Soesoe (Susu), 12½ miles from the light vessel. It has an outer and inner bar, with depths, in 1934, of 13 and 14 feet (4^m0 and 4^m3), respectively. The outer bar lies between the light vessel and the outer light-buoy, and the inner bar between the southern side of Sembilan island and Pangkalan Soesoe.

A light-vessel, painted black, with one mast, with *Aroebaai* on its sides, and exhibiting a light, at an elevation of 66 feet (20^m1), is moored at the entrance to Sembilan channel, about 8½ miles east-north-eastward of Sembilan island light structure.

Sembilan channel is marked on its starboard hand on entering by white conical buoys; of these the outer one, situated about 3¾ miles west-south-westward of the light vessel, exhibits a *white flashing* light

Charts 1353, 1355, 748b.

Chart 3574, plan of Aru bay.

every twelve seconds (flash *five seconds*), and two others situated about a quarter of a mile and one mile, respectively, west-south-westward of the south-western extremity of Sembilan island, exhibit *green fixed* lights.

The port side on entering is marked by light-buoys, painted black; of these the first and third from seaward exhibit a *red flashing* light *every twelve seconds* (flash *five seconds*); the second from seaward an *occulting* light *every six seconds*, and the remainder *red fixed* lights.

Babalan channel is entered about 1¾ miles south-eastward of the outer light-buoy marking Sembilan channel, and leads to Pangkalan Brandan, an oil-loading station on the right bank of Sungei Babalan, about 4½ miles from its mouth. There is a least depth of 3 feet ($0^{\text{m}}9$) over the bar of the channel.

The channel is marked on its south-eastern side by a black can buoy, situated about 5¼ miles north-eastward of the beacon standing on the western side of the entrance to Sungei Babalan, and by two light-buoys, the outer one, painted black, exhibiting a *white flashing* light *every twelve seconds* (flash *five seconds*), and the inner one, painted white, exhibiting a *green flashing* light *every twelve seconds* (flash *five seconds*), situated about 3¾ and one mile, respectively, north-eastward of the beacon on the western side of the entrance to Sungei Babalan.

The bottom consists of stiff mud and sand.

Lights.—A light (*Lat. 4° 08′ N., Long. 98° 15′ E.*) is exhibited, at an elevation of 78 feet ($23^{\text{m}}8$), from a white iron framework structure, 88 feet ($26^{\text{m}}8$) in height, on the southern extremity of Sembilan island.

A light is occasionally exhibited, at an elevation of 12 feet ($3^{\text{m}}7$), from a post, at Koempai settlement.

A light is exhibited, at an elevation of 14 feet ($4^{\text{m}}3$), from a beacon on Ujong Siata, and also at Tanjong Batoe (Batu), about three-quarters of a mile southward of it.

Pilots.—The light-vessel is the pilot vessel. Pilotage is compulsory for all channels. Vessels requiring a pilot should make the usual signals. Vessels arriving together will be given preference according to tonnage. For signals, *see* page 18.

Tidal streams.—The tidal streams in Aroe baai, set generally in the direction of the channels, and attain a maximum rate of 2 knots at springs. Outside the outer bar of Sembilan channel the in-going stream sets south-westward, and the out-going stream north-north-eastward. The out-going stream often continues to run over the outer bar for some time after the in-going stream has made in Malacca strait outside the shoals.

Regulations.—The following are the general regulations for navigating the Salahadji and Babalan in Aroe baai, also the Langkat, Asahan, and Siak rivieren and other navigable streams:—

In the bends of the rivers steam vessels must proceed at a speed not exceeding 6 knots; when approaching the bends they must make short quick blasts on the whistle, sound the ship's bell, or a gong. All vessels going up-stream, on hearing the signal in the vicinity of a point, must keep close to that point, and if necessary slacken speed or stop, in order to leave the bend clear for vessels descending the river, such vessels to make no more speed than necessary for steerage way. Vessels going in the same direction must only pass one another in a

Charts 1353, 1355, 748b.

Chart 3574, plan of Aru bay.

suitable place in the river. A stern anchor must always be in readiness.

A sailing vessel at or near a sharp bend must keep close to the shore when a steam vessel is approaching, and must keep on the opposite side of the turn to that chosen by the steam vessel. In the straight reaches of the river, all vessels must keep to the starboard side as much as is possible. Anchoring in bends or in narrow places is prohibited; vessels compelled to stop in such places must run aground.

Rivers.—Beacon.—Sungei Serangdjaja (Serangjaya) flows out on the northern side of Koempai and is difficult to enter from seaward; in 1944, it had a depth of only 3 feet ($0^{m}9$) on its bar. The usual entrance is through Koempai channel and thence through Troesan Serangdjaja, where, in 1925, there was a least depth of 7 feet ($2^{m}1$), but this passage is in places only 100 feet ($30^{m}5$) wide, and navigation is difficult on account of the bends.

A beacon, surmounted by a black cylinder, is situated on the south-western side of the entrance to Troesan Serangdjaja.

A wharf (*Lat. 4° 12′ N., Long. 98° 13′ E.*), about 90 feet ($27^{m}4$) long, is situated on the left bank of Troesan Serangdjaja, in the bend about 2 miles from its mouth, and small craft with local knowledge can lie alongside at all times.

Sungei Salahadji joins Sungei Besitang at Ujong Siata, and is of some importance as it leads to Air Poetih (Putih), a timber-loading station about 6 miles up from Ujong Siata, and which can be reached by vessels with local knowledge, drawing 9 feet ($1^{m}5$). Off Bukit Tiram, situated on the left bank of the river nearly 4 miles from Ujong Siata, there is a landing stage.

Ujong Siata, which can be identified by the light structure on it, is at some states of the tide difficult to round, but the channel northward of it is marked by a black can buoy on the southern side and a white conical buoy on its northern side.

Sungei Babalan is navigable, except for very small craft, as far as Pangkalan Brandan.

About 1¼ miles westward of Tanjong Bedoekang is the entrance to Sungei Lepan. Small craft with local knowledge drawing 5 feet ($1^{m}5$), can get up as far as the railway bridge, about 6 miles from its entrance. The ebb stream is very strong in this river.

Anchorages.—Wharves.—Good anchorage may be obtained, in depths of from 5 to 6½ fathoms ($9^{m}1$ to $11^{m}9$), about 1¼ cables offshore, with the southern extremity of Koempai bearing 038°. During fine weather the 3-fathom ($5^{m}5$) patch, situated about 1¾ cables south-south-westward of the point, is marked by tide-rips and by discolouration of the water north-eastward of it.

There is a wharf at the settlement at Koempai, alongside which vessels of not more than 150 feet ($45^{m}7$) in length may lie.

At Pangkalan Soesoe, the principal oil-loading station, there is a Government wharf about 800 feet ($243^{m}8$) long, with depths, in 1926, of from 8 to 15 feet ($2^{m}4$ to $4^{m}6$) alongside, and three other wharves, with depths of 21 feet ($6^{m}4$) alongside. Vessels of from 10,000 to 15,000 tons can be berthed alongside. There is a crane with a lifting capacity of about 10 tons. The ebb stream sets on to these wharves, and the flood away from them.

Charts 1353, 1355, 748b.

Chart 3574, plan of Aru bay.

If there is no vacant berth alongside the wharves, a vessel may obtain anchorage southward of the Harbour master's office, which is situated just westward of the light structure on Sembilan, in a depth of about 3¼ fathoms ($5^{m}9$), about one cable from the island.

The roadstead of Pangkalan Soesoe lies between the meridian of the south-eastern extremity of Sembilan and lines in a 315°-135° direction through the north-eastern extremity of Kerapoe, situated close south-eastward of Pandjang, and a line joining the north-eastern extremity of Pandjang and the south-western extremity of Sembilan.

At Pangkalan Brandan there is a wharf equipped with two cranes with lifting capacities of 10 and 7 tons, with a depth of 19 feet ($5^{m}8$) alongside, and a landing pier with a depth of 5 feet ($1^{m}5$) alongside.

The roadstead at Pangkalan Brandan lies between a line drawn 135° through Tanjong Balai, about 1¼ miles below the settlement, and the meridian of 98° 16′ E.

There is a hospital at the settlement.

Prohibited anchorage.—Beacons.—Vessels are prohibited from anchoring within a distance of about a quarter of a cable on either side of a submarine cable, the track of which is shown on the chart about half a mile westward of the light structure on the southern extremity of Sembilan. Two red beacons, each surmounted by a triangle, stand on either side of the cable hut on Sembilan.

Directions.—A vessel making for the entrance to Koempai channel should steer for Platte Heuvel (page 68), bearing 270°; it is the highest and southernmost hill in this vicinity; this course will lead to the fairway buoy, after passing which, she should be guided by the channel buoys to the anchorage off the settlement at Koempai (*Lat. 4° 11′ N., Long. 98° 14′ E.*) or to the entrance of Sungei Salahadji.

A vessel approaching the entrance to Sembilan channel should keep outside the 10-fathom ($18^{m}3$) line until *Aroebaai* light-vessel is identified. As the distance between the outer and inner bars is about 10 miles and as high water is about half an hour earlier on the inner bar than on the outer bar, vessels are recommended to cross the outer bar on a rising tide, leaving the light-vessel within half an hour of high water. Except on the inner bar, the bottom, generally, is of soft mud.

Communication.—There is regular steamer communication between Pangkalan Soesoe, Pangkalan Brandan, and other ports of Sumatra.

Both settlements are connected to the railway of the east coast.

Chart 1353.

COAST.—Buoyage.—Sungei Gebang and Sungei Serapoeh flow out about 3½ and 4 miles, respectively, south-eastward of Tanjong Bedoekang. There is a depth of 3 feet ($0^{m}9$) in the channel over the bar leading into Sungei Gebang. Between the mouths of the two rivers the coast consists of dark mud with mangroves, and close eastward of the mouth of the Serapoeh are several tall casuarina trees standing close to the sandy beach that extends eastward to the entrance of Sungei Langkat, 2¼ miles eastward, and behind this beach there is a high wood.

Between Tanjong Bedoekang and the entrance to Sungei Langkat, a bank, with depths of less than 3 fathoms ($5^{m}5$), extends from 4 to 4½ miles offshore.

Charts 1355, 748b.

Chart 1353.

A conical buoy, painted in red and black stripes, and surmounted by a staff and ball, is moored about 4 miles northward of the eastern entrance point of Sungei Gebang, and about 2½ miles eastward of this buoy is a conical buoy, painted in red and black bands, and surmounted by a staff and ball.

A light-buoy, painted white, exhibiting a *white flashing* light *every twelve seconds* (flash *five seconds*), is moored about 2½ miles north-north-eastward of the eastern entrance point of Sungei Serapoeh.

A light-buoy, painted white, exhibiting a *green flashing* light *every twelve seconds* (flash *five seconds*), marks the outer end of a spit which dries, extending about one mile northward from the western entrance point of Sungei Serapoeh.

Sungei Serapoeh.—Beacon.—Sungei Langkat.—There was, in 1927, a least depth of about 3 feet ($0^{m}9$) over the outer bar of the Serapoeh channel, and this is the least depth in the river as far as the settlement at Tandjoeng Poera, which is situated about 10 miles from the mouth of Sungei Langkat. In consequence, however, of the silting up of the mouth of Sungei Langkat, vessels can only reach Tandjoeng Poera by entering the Serapoeh, and thence through Trusan Sanga Lima, joining the Sungei Langkat about 6 miles from Ujong Damak, the western entrance point of Sungei Langkat. Vessels 180 feet ($54^{m}9$) long and with a draught of 8 feet ($2^{m}4$) can reach Tandjoeng Poera, but local knowledge is necessary.

A white wooden rectangular beacon stands near the western side of the entrance to Sungei Serapoeh.

A vessel approaching the entrance to Sungei Serapoeh should steer to pass close eastward of the two light-buoys, and when abreast of the inner one should steer for the beacon near the western side of the entrance; when inside the entrance she should keep to the outer side of the bends.

At Tandjoeng Poera (*Lat. 3° 54′ N., Long. 98° 25′ E.*), where the river is about 90 yards ($82^{m}3$) wide, there is a wharf, with depths of from 6 to 10 feet ($1^{m}8$ to $3^{m}0$) alongside. Motor boats can ascend the river to Stabat, 11 miles above Tandjoeng Poera.

Tandjoeng Poera, which is the headquarters of an Administrator, is connected to the main railway line of the east coast.

There is regular steamer communication with other ports of Sumatra.

Small craft with local knowledge can enter Sungei Langkat, the mouth of which may be identified by some high trees on Ujong Damak, and a conspicuous tree on Tanjong Bidoe, the eastern entrance point; some high casuarina trees on Poesoeng (Pusung), an island 2¾ miles eastward of Tanjong Bidoe, are also conspicuous.

The channel in the approach, lies between drying flats, the western of which extends 3½ miles offshore; it has a depth of 1½ feet ($0^{m}5$), mud and sand, and is marked on either side by fishing stakes.

Coast.—Danger.—Kuala Tapak Koeda (Kuda) may be identified by Koeda Poesoeng, which lies on the eastern side of the entrance. In 1927, there was a depth of 6 feet ($1^{m}8$) on the outer bar, but inside there was a depth of 10 feet ($3^{m}0$) as far as the village of Tapak Koeda, which is situated about three-quarters of a mile southward of the eastern entrance point. This village is accessible by boats from Tandjoeng Poera. The river should only be entered by small craft with local knowledge.

Charts 1355, 748b.

Chart 1353.

Karang Gading bank, with a least depth of 2¼ fathoms ($4^{m}1$), is a ridge with a hard bottom lying parallel to the coast, the shoalest part lying about 5 miles east-south-eastward of Poesoeng.

Ujong Ahoe (Ahu), 7½ miles south-eastward of Poesoeng, can only be identified from eastward by the casuarina trees on it.

Chart 1353, plan of Deli river.

Tanjong Beting Tjamar is covered with trees.

DELI RIVIER.—This river has two entrances, separated by the island of Belawan, situated 6½ miles southward of Tanjong Beting Tjamar; the northern channel leads to Belawan rivier, at the entrance to which is Belawan, the port of Medan. *See* view facing this page.

The coast in the vicinity is mostly low, muddy, and covered with mangroves; in the approach to the river there are numerous fishing stakes. (*See* page 20).

Tanjong Perling, the south-eastern entrance point of the river, can be identified only from south-eastward. Under favourable conditions the Wilhelmina keten (page 68) and Van Heutsz gebergte, south-westward and southward, respectively, of Belawan, can be distinguished. When approaching from north-eastward a vessel should steer for the valley between the two ranges.

The port of Belawan which is the most important in Sumatra, lies between the parallels of 3° 55′ N. and 3° 46′ N. and the meridians of 98° 40′ E. and 98° 43′ 10″ E.

Pilots.—Pilotage is compulsory for vessels of more than 350 gross tons. Vessels requiring a pilot should display the appropriate signal of the International Code of Signals, and keep it displayed until the pilot is onboard. If two or more vessels arrive together, preference will be given to that of the greater tonnage.

Channel.—**Buoyage.**—The channel leading to Belawan is 164 feet ($50^{m}0$) wide, and, in 1946, had a least depth of 16 feet ($4^{m}9$). It is marked at its entrance by a red drum buoy, situated about 2¾ miles eastward of Tanjong Beting Tjamar, thence by red can buoys on the western side and black can buoys, Nos. 12 to 1 from seaward, on the eastern side.

Light.—A light is exhibited from the roof of a shed near the eastern end of Ocean quay, on the northern side of the island of Belawan.

Obstruction.—An obstruction, with a least depth of 15 feet ($4^{m}6$), is situated on the western side of the channel about 2½ miles east-south-eastward of Tanjong Beting Tjamar.

Traffic signals.—The following traffic signals are shown at the entrance to Sungei Noenang for vessels proceeding to sea or entering the river:—

By day:—A black ball between two black cones, points up, or

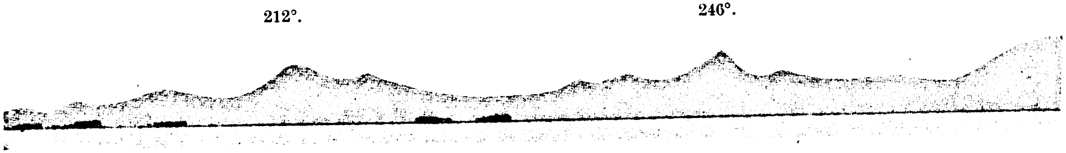
By night:—A *red* light between two *white* lights, disposed vertically, signifies that vessels of from 1,050 to 3,500 registered tonnage are not to enter Belawan channel, and no vessel lying at the anchorage is to un-moor or shift berth without the Harbour master's permission.

By day:—A black cone, point up, over two black balls, disposed vertically, signifies that vessels of the above-mentioned tonnage may enter the Belawan channel if their draught does not exceed 13 feet ($4^{m}0$).

Dredger signals.—Suction dredgers in the Belawan channel

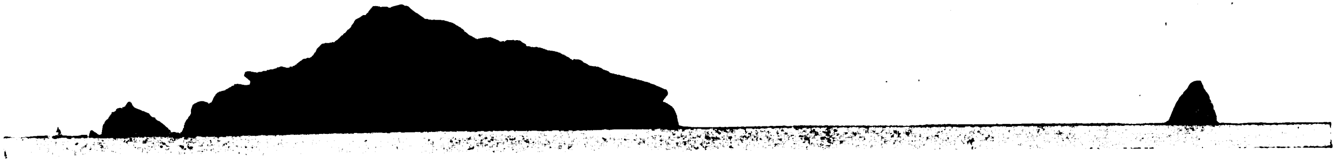
Charts 1355, 748b.

To face page 74.



Deli rivier entrance, bearing 246°, distant 19 miles.

(*Original dated* 1902.)



Berhala, bearing 186°, distant 1¼ miles.

(*Original dated* 1902.)

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Chart 1353, plan of Deli river.

show the following signals in addition to the regulation marks and lights:—

By day:

- (i) If the dredgers are at work:
  - (*a*) A cone at the yardarm indicates that vessels should keep to the eastern side of the channel.
  - (*b*) Two cones at the yardarm indicate that vessels should keep to the western side of the channel.
- (ii) If the dredgers are anchored with the suction apparatus on the bottom, an anchor at the yardarm indicates that vessels should pass on the side on which the anchor is shown.

By night:

- (i) If the suction apparatus is on the bottom:
  - (*a*) A *green* light at the yardarm indicates that vessels should keep to the eastern side of the channel.
  - (*b*) A *red* light at the yardarm indicates that vessels should keep to the western side of the channel.
- (ii) When the suction apparatus is not on the bottom no special signal will be made.

When two dredgers are working at a distance of not more than half a mile apart, in the event of a vessel approaching, the dredger farthest away from the approaching vessel will cross over to the same side of the channel as the dredger nearest the approaching vessel.

Great care must be exercised in passing a dredger on the bar, as the narrowness of the channel permits of giving her very little sea room.

Tidal streams.—Outside of, and off the entrance to the dredged channel to Belawan (*Lat. 3° 47′ N., Long. 98° 41′ E.*) the in-going stream sets south-eastward and the out-going stream north-north-westward, both at a maximum rate of 2 knots. At neaps there is at times no stream at all. At the beginning of the channel near the outer light-beacon, the stream sets in the direction of the fairway, the out-going stream attaining at springs a rate of 3 knots, and the in-going stream rather less than 2 knots.

It was reported, in 1937, that the tidal stream at Ocean pier turns about one hour later than at the entrance to the dredged channel.

Anchorage.—The anchorage is close northward of the red drum buoy at the entrance to the channel, in depths of from 20 to 30 feet ($6^{m}1$ to $9^{m}1$), mud, with good holding ground.

Prohibited anchorage.—Vessels are prohibited from anchoring within a distance of 3½ cables on either side of the axis of the dredged channel to Belawan up to a northern limit of lat. 3° 55′ N. Vessels are also prohibited from anchoring off Belawan eastward of long. 98° 41′ E.

Belawan.—The settlement of Belawan, which consists of shipping and railway business premises, is situated on the western side of the island of the same name, and off it is the anchorage.

At the northern end of the settlement is a camber for praus.

Wharves.—The wharves on the western side of the island have a frontage of 2,625 feet ($800^{m}1$). On the northern side of the island is Ocean quay, with a frontage of 3,881 feet ($1182^{m}9$). At the western end of Ocean quay is Ocean pier, 590 feet ($179^{m}8$) long. There are two coaling jetties close westward of Ocean pier. These wharves are connected to the Deli railway.

Charts 1355, 748b.

Chart 1353, plan of Deli river.

In 1946, there were two berths of 420 and 1,808 feet (128^{m}0 and 551^{m}0) in length at Ocean quay, with depths of from 13 to 21 feet (4^{m}0 to 6^{m}4) alongside, separated by two wrecks, 300 feet (91^{m}4) apart.

Harbour facilities.—Water may be obtained alongside Ocean quay and Ocean pier. Fresh provisions are obtainable.

There is a hospital for infectious diseases at Belawan.

Minor repairs to vessels can be effected. There is a patent slip, details of which are given in Appendix III.

Communication.—There is regular steamer communication with other parts of Sumatra. Belawan is connected to the railway of the east coast.

Deratisation.—*See* page 17.

Chart 1353.

Medan.—Medan, situated about 11 miles southward of Belawan, is the seat of Government of the east coast of Sumatra, and is a large modern town, with a healthy climate.

Medan (*Lat. 3° 35′ N., Long. 98° 40′ E.*) is connected to the railway of the east coast.

Radio station.—There is a radio station at Medan. *See* page 16.

Trade.—The principal exports are rubber, tobacco, tea, coffee, copra, palm oil, fibre, and gambier; the chief imports are rice, flour, machinery, manures, iron ware, cement and petroleum.

Meteorological table.—*See* page 35.

COAST.—From Tanjong Beting Tjamar to the mouth of Sungei Serdang, about 15 miles south-eastward, the coast consists almost entirely of mud and mangroves, but thence to Telok Mengkoedoe (Mengkudu), about 18 miles south-eastward, there is a considerable amount of sandy beach, with casuarina and other high trees; thence to beyond Telok Baharoe, about 19 miles farther south-eastward, there is again mud and mangroves, succeeded by a sandy coast with casuarina trees, as far as Tanjong Tandjoeng (Tanjung) (chart 794), 7 miles farther south-eastward.

As most of the plantations owned by Europeans lie near the coast, there is local traffic for small steamers, for which the mouths of the important rivulets are marked by beacons and weak lights, of no use to passing vessels.

There are, at several places along the coast, fishing stations of some size, of which, however, little can be seen from the offing. There are also numerous fishing stakes on the banks fronting the coast, mostly within the 3-fathom (5^{m}5) line, but in places they extend out to the depth of 5 fathoms (9^{m}1).

Most of the banks can be approached by sounding, but the bank on the eastern side of the approach to Deli rivier is steep-to, as is also that eastward of Telok Mengkoedoe. The depths also are somewhat irregular off this coast, and the bottom contains more stones than farther westward.

Between Tanjong Perling and Tanjong Tandjoeng, several small rivers discharge, which can only be entered by small craft with local knowledge at or near high water; the most important of them have unofficial lights at the entrances.

Rantau Pandjang, at the mouth of Sungei Serdang, may be identified

Charts 1355, 748b.

Chart 1353.

by some high trees standing about 2½ miles eastward of it. On both sides of the mouth of this river the uniformly green aspect of the coast is broken by sandy beaches. About 6 miles up the river is the station of Serdang, on the east coast railway. The approach to the river dries.

Tanjong Si Boenga Boenga (Bunja Bunja), 8½ miles east-south-eastward of the mouth of Sungei Serdang, may be identified by a dense casuarina wood. At the point, and for about 2 miles westward of it, there is a white sandy beach. Sungei Perbaoengan discharges close eastward of the point, and at its mouth is a pier, on which is a large shed, which, with a white house in the vicinity, are conspicuous from eastward. Sungei Bedagai, which discharges about 8 miles south-eastward of Telok Mengkoedoe, can be identified by a wood of high trees at its mouth, eastward of which are several detached clumps of trees. There is a small pier at its mouth and on the left bank is the village of Koeala (*Lat. 3° 30′ N., Long. 99° 14′ E.*). There is a depth of one foot ($0^{m}3$) in the channel into the river.

Between the mouth of Sungei Bedagai and Telok Baharoe (Baharu), about 11 miles south-eastward, fishing enclosures extend out to the 5-fathom ($9^{m}1$) line, making navigation close inshore difficult at night. About 5 miles south-eastward of Sungei Bedagai is the mouth of the Sungei Padang, which is about half a cable wide, with a depth of 1½ feet ($0^{m}5$).

About 1¾ miles up the river is the village of Bandar Chalipah. About 2½ miles south-eastward of the mouth of Sungei Padang is the mouth of Sungei Pagoerawan (Pagurawan), with a depth of 1½ feet ($0^{m}5$) in the channel, which is marked by unofficial beacons, each surmounted by a cross.

Chart 794.

Telok Baharoe (Baharu) has a depth of 1½ feet ($0^{m}5$) in the channel leading to Sungei Si Pare Pare, which is marked on its western side by pole beacons, the outermost of which stands 2¾ cables northward of the eastern entrance point. Baharoe village is situated not far from the mouth and has a Customs pier.

The river, which flows out at Tanjong Tandjoeng, is about three-quarters of a cable wide, and the depth in the channel, which is marked by stake beacons, is only 6 inches ($0^{m}2$). Anchorage may be obtained off the mouth of the river, in depths of from 6½ to 10 fathoms ($11^{m}9$ to $18^{m}3$), with a clump of casuarina trees bearing 169°; it is steep-to here. Abreast and eastward of the river mouth part of the coastal bank is just covered at high water. When entering, this bank, which may be distinguished by the whiteness of its sand, should be left on the port hand. There is a Customs pier at the entrance.

Tanjong Tandjoeng is low, but can be identified by its white sandy beach and high trees. A strong current sometimes sets here along the coastal bank. Vessels, when crossing the mouth of the river, should not get into a depth of less than 9 fathoms ($16^{m}5$).

Chart 1353.

Off-lying shoals.—Buoyage.—Deli bank is the general name of the banks situated within the 10-fathom ($18^{m}3$) line, with its north-western extremity about 12½ miles east-north-eastward of Tanjong Beting Tjamar, and thence trending 22 miles south-eastward nearly parallel with the coast.

Boenga banken (Bunja shoals), near the south-eastern end of Deli

Charts 1355, 748b.

Chart 1353.

bank, consists of two ridges of sand lying parallel with the coast and with one another, from about 6 to 9 miles north-eastward of Tanjong Si Boenga Boenga. The outer ridge has depths of from 5 feet to 3 fathoms ($1^{m}5$ to $5^{m}5$), mud, sand, and shells, and is steep-to on its outer side. The inner ridge has depths of from one to 3 fathoms ($1^{m}8$ to $5^{m}5$). The shallow portions of both ridges are generally marked by tide-rips, and with any swell these will break. Between the inner ridge and the coastal bank, tide-rips and discolouration of the water are frequently observed.

A light-buoy, painted in black and white chequers, exhibiting a *white occulting* light, eclipsed for *three seconds every six seconds,* is moored near the north-western extremity of the outer ridge of Boenga banken.

A conical buoy, painted in red and white chequers, and surmounted by a staff and ball, is moored at the south-eastern extremity of the inner ridge of Boenga banken.

Rug van Si Djenggi (Sijengi ridge) is a shoal ridge, with a least depth of one fathom ($1^{m}8$), lying parallel with the coast and about 2 miles offshore, north-eastward of Tanjong Si Djenggi (*Lat. 3° 38′ N., Long. 99° 03′ E.*), which lies about 4½ miles south-eastward of Tanjong Si Boenga Boenga. Between this ridge and the coastal bank there are depths of from 4 to 6½ fathoms ($7^{m}3$ to $11^{m}9$), and between it and the inner ridge of Boenga banken there are two 4¼-fathom ($7^{m}8$) patches.

There are also several 4½-fathom ($8^{m}2$) patches lying from 5½ to 8 miles west-north-westward of the north-western end of Rug van Si Djenggi ridge, and about 2 miles offshore.

Chart 794.

Mati bank, the north-western extremity of which is situated about 2½ miles north-eastward of Tanjong Tandjoeng, lies parallel with the coast, and has a least depth of 8 feet ($2^{m}4$) near its north-western end. At its south-eastern extremity is a 2-fathom ($3^{m}7$) patch, named Beting Neneh. The water here is discoloured when the stream is running strongly.

Buiten (Outer) Mati bank, with a least depth of 4½ fathoms ($8^{m}2$), situated 7½ miles north-north-eastward of Tanjong Tandjoeng, is composed chiefly of hard sand, and the water over the bank is at times discoloured.

Coast.—Between Tanjong Tandjoeng and Tanjong Tiram, 9 miles south-eastward, the coast is bordered by a white sandy beach for the whole distance, except for a bank of mud and mangroves northward of the mouth of Sungei Gamboes (Gambus), situated about 2 miles southward of Tanjong Tandjoeng.

Batoe Bara rivier.—Light-beacons.—Batoe (Batu) Bara rivier, which discharges on the eastern side of Tanjong Tiram, has a least depth in the channel in its approach of just over one foot ($0^{m}3$). Vessels with a draught of 7 feet ($2^{m}1$) can enter at high water.

Two leading beacons are situated on the eastern side of the entrance; the front beacon is 13 feet ($4^{m}0$) high, and is surmounted by a triangle, and the rear beacon is 20 feet ($6^{m}1$) high and is surmounted by an inverted triangle; a light is occasionally exhibited from each beacon.

A tide gauge, marked in feet, showing the least depth in the channel,

Charts 1355, 748b.

Chart 794.

is secured to the unofficial white stake beacon surmounted by a ball, situated at the outer end of the channel, about 1¼ miles northward of Tanjong Tiram, and is occasionally marked by a light.

The channel is marked by unofficial beacons on either side, some of which are occasionally marked by a light.

Tandjoeng Tiram (Tanjung Tirem) is a settlement, chiefly inhabited by Chinese, situated on the left bank about half a mile above Tanjong Tiram. There is a Custom house here.

There is regular steamer communication with Penang.

Large fish enclosures are situated up to a distance of 4 miles from the coast, into depths of 4 fathoms ($7^{m}3$) in this vicinity.

Directions.—A vessel entering should pass westward of the tide gauge beacon at a distance of not more than 27 yards ($24^{m}7$), and should then steer for the white cross beacon situated about 3¼ cables southward of the tide gauge beacon, and pass close eastward of it, thence she should keep the leading beacons in line. In 1940, there was a least depth of one foot ($0^{m}3$) in the channel.

Coast.—Tanjong Tamboen Toelang (Timbun Tulang), about 11 miles east-south-eastward of Tanjong Tiram, is a low, overgrown point. About three-quarters of a mile westward of the point is the mouth of Sungei Tamboen Toelang (Timbun Tulang), which dries, and the village of the same name.

Bank van Tamboen Toelang (Timbun Tulang), with depths of from one to 3 fathoms ($1^{m}8$ to $5^{m}5$) and fairly steep-to, extends 4½ miles north-eastward from Tanjong Tamboen Toelang. The edge of the bank is approximately marked by numerous fishing stakes.

Tidal streams.—The tidal streams set south-eastward and north-westward, attaining a rate of 2 knots; the streams turn from three-quarters of an hour to one hour after high and low water, respectively, in Asahan rivier (page 81).

Off-lying islands and banks.—Light.—Berhala, 581 feet ($177^{m}1$) high, lies about 25 miles northward of Tanjong Tandjoeng; it is thickly covered with vegetation, and is an excellent landmark. *See* view facing page 74. It is steep-to on the north-eastern and south-western sides.

A wooded islet (*Lat. 3° 46′ N., Long. 99° 30′ E.*), 151 feet ($46^{m}0$) high, lies nearly three-quarters of a cable from its south-eastern point, and is connected with it by a coral ridge, which dries. About half a mile north-westward of the island is a similar rocky islet, 141 feet ($43^{m}0$) high, which shows white in places. Between Berhala and this islet there are depths of from 5 to 7 fathoms ($9^{m}1$ to $12^{m}8$). On the southern side of the island are two sandy beaches, separated by a salient rocky point, with rocks above water; the eastern beach affords the best landing; on the western beach a stream discharges in the rainy season.

Anchorage may be obtained on the ridge extending south-eastward from Berhala, in a depth of about 9 fathoms ($16^{m}5$), with the summit of the island bearing 302°, about 4¼ cables offshore.

Berhala bank, over which there is a least depth of 6 fathoms ($11^{m}0$), lies with its south-eastern end about 7 miles north-north-westward of Berhala. It affords good anchorage over mud and sand.

About 4 miles south-westward of Berhala is the north-western extremity of another bank, over which there is a least depth of 7 fathoms ($12^{m}8$).

Charts 1355, 748b.

Chart 794.

The water is discoloured over these banks during the strength of the tidal streams, and there are occasional tide-rips.

The Brothers, consisting of Pandang and Salahnama, are two thickly overgrown, rocky islands, 213 and 295 feet (64^m9 and 89^m9) high, respectively, situated 15 and 10½ miles north-eastward, respectively, of Tanjong Tiram.

Pandang is almost entirely surrounded by a coral reef with some rocks above water on it. There is a small breakwater on its eastern side, about three-quarters of a cable from its southern end, forming a boat camber, with a depth of 2 feet (0^m6) in it.

Anchorage may be obtained about three-quarters of a mile from the north-western and south-eastern sides of Pandang and Salahnama.

Salahnama is densely wooded, and its rocky sides rise steeply from the sea. A rock above water lies about 1¼ cables northward of the island, and another 4½ cables south-eastward of the southern point.

A light (*Lat. 3° 26′ N., Long. 99° 46′ E.*) is exhibited, at an elevation of 183 feet (55^m8), from a white iron framework structure, 30 feet (9^m1) in height, on Pandang.

Tidal streams.—The tidal streams set south-eastward and north-westward and turn about one hour after high and low water, respectively, at Tanjong Tiram.

Discoloured water.—Strong tidal streams in conjunction with rapid changes in depth form troubled areas of water, the upper surfaces of which often take the form of smooth eddying patches, followed by areas of broken water, giving a strong impression of shoals. This impression is strengthened by the fact that the vertical upward movement of the water brings mud from the bottom, and causes sharply defined areas of discoloration. Off the coastal banks and isolated shoals, as well as off the mouths of the rivers, discoloured water is met with. At some places on the coast, as at Aroe baai, a strong phosphorescence is noticeable off the mud banks fronting the shore, and where this bank is broad, it is much accentuated by a high wind, so that the light given off is said to be the best indication of the nearness of land.

Asahan rivier.—Lights.—Danger.—Buoys.—Asahan rivier is entered between Tanjong Napal, 10½ miles south-eastward of Tanjong Tamboen Toelang, and Tanjong Djoempoel (Jumpul), about 1½ miles east-south-eastward; these points and the coast in the vicinity are low, muddy, and overgrown with mangroves.

Charts 794, 1355.

The peaks of the Asahan, Koealoe and Bila ranges are sometimes visible. Soeroengan (Surungan), 7,245 feet (2208^m3) high, 47 miles south-westward of Tanjong Djoempoel, is the highest peak of Asahan gebergte; it is steeper on its eastern side than on the western. The highest peak of Koealoe gebergte, 17 miles southward of Soeroengan, is 7,672 feet (2338^m4) high. Sigoempoelan (Si Gumpulan) of the Bila gebergte, 10 miles farther south-eastward, is 6,491 feet (1978^m4) high.

A light is exhibited, at an elevation of 44 feet (13^m4), from a white iron framework structure, 46 feet (14^m0) in height, at Bagan, on the left bank of the river, about 1¼ miles southward of Tanjong Napal.

Chart 794.

Bank van Djoempoel (Jumpul) extends about 6½ miles northward

Charts 1355, 748b.

Chart 794.

from Tanjong Djoempoel, with depths of less than 3 fathoms ($5^{m}5$), and dries for a distance of 2 miles northward from the point. The north-eastern and eastern edges of the bank are steep-to. From south-eastward the bank can be picked up by sounding, but not when approaching from north-westward. Fishing enclosures, some of which are marked by reflectors, are erected on the bank, and in places close to the buoyed channel.

A conical buoy, painted in red and black stripes, surmounted by a ball, is moored on the north-eastern edge of Bank van Djoempoel, about 6 miles north-north-eastward of Tanjong Djoempoel.

A conical buoy, painted in red and black bands, surmounted by a ball, is moored 7½ miles northward of the light structure at Bagan.

The channel in the approach to the entrance of Asahan rivier runs along the edge of the bank, which dries, extending offshore north-westward of Tanjong Napal (*Lat. 3° 03′ N., Long. 99° 52′ E.*), and had, in 1940, a least depth of 5½ feet ($1^{m}7$) ; above Bagan, the least depth in the channel to the wharf at Telok Niboeng (Nibung) was, in 1939, about 3 feet ($0^{m}9$) ; in the channel between Telok Niboeng and Tandjoeng (Tanjung) Balai, the least depth was about one foot ($0^{m}3$).

Lights are exhibited from leading beacons for several of the reaches between the mouth of the river and Tandjoeng Balai ; they are frequently moved as the channels change.

A white conical buoy surmounted by a ball is moored on the south-western side of the channel, about 4 miles north-north-westward of Tanjong Napal, and a black can buoy surmounted by a cone is moored on the north-eastern side of the channel, about 1¼ miles northward of the same point. Thence to the light structure at Bagan the channel is marked by a white conical buoy on the western side and two black can buoys on the eastern side.

Tidal streams.—The in-going tidal stream sets on to the northern edge of Bank van Djoempoel, and the out-going stream away from it. Off the mouth of the Asahan the in-going stream makes about one hour after low water, and in the river attains a rate of 1½ knots at springs ; the out-going stream, which makes about three-quarters of an hour after high water, attains a rate of 3 knots in the river.

There is a tide gauge, marked in decimetres off Bagan, which gives the depth on the bar eastward of Bagan. There are also tide gauges at Telok Niboeng and Tandjoeng Balai.

Directions.—A vessel approaching from north-westward should bring the entrance to the river to bear about 190°, and then steer for the outer buoy. A vessel from south-eastward, with a draught of not more than 10 feet ($3^{m}0$), may round Bank van Djoempoel close-to, in a depth of about 3¾ fathoms ($6^{m}9$), and when the light structure at Bagan bears 242° she may cross the bank westward in a least depth, in 1929, of about 12½ feet ($3^{m}9$) at half-tide. The channels are continually changing, so that only vessels with local knowledge should attempt to enter the river.

Settlements.—Telok Niboeng is a small settlement situated on the left bank of Asahan rivier, about 4¾ miles above the light structure at Bagan ; it has a wharf, about 330 feet ($100^{m}6$) long, with a least depth in 1941, of 19½ feet ($6^{m}0$) alongside, and is connected to the railway on the east coast.

Tandjoeng Balai, situated on the left bank, about 2 miles above

Charts 1355, 748b.

Chart 794.

Telok Niboeng, and at the junction of Asahan rivier with Sungei Silau, is the principal town of the district of Asahan, and the residence of an Assistant Resident and of the Sultan of Asahan. It has a wharf, with a least depth, in 1941, of 10 feet (3^m0) alongside.

The river is navigable by motor launches as far as Bandar Poelau, about 40 miles above Tandjoeng Balai.

There is regular steamer communication with Penang.

Coast.—Between Tanjong Djoempoel and Tanjong Si Api Api, 8½ miles south-eastward, the coast is fringed by a mudbank, with depths of less than one fathom (1^m8), extending from 6 miles eastward from the former point to 1½ miles from the latter; thence to Tanjong Pertandangan (*Lat. 2° 42′ N., Long. 100° 14′ E.*), 20 miles farther, the coast forms a bay encumbered with shoals, between which there are several navigable channels leading to the mouths of the rivers Koealoe (Kwalu) and Panai. The coast is low, and in most places bordered by mangroves. On the banks on either side of the bay there are several fishing huts and stakes, some of the latter being marked by reflectors.

Tanjong Loedam (Ludam), about 6 miles south-eastward of Tanjong Djoempoel, can be identified by the high and dense woods a short distance inland of it. Tanjong Si Api Api is a low point overgrown with mangroves; the mudbank southward of it extends nearly 2¼ miles offshore, and is steep-to.

Approaches to Koealoe and Panai rivieren.—Light-buoys.—Beacon.—The coast forming the western side of Koealoe channel has no distinctive marks, except a Customs station built on piles close off the village of Simendoelang, about 7 miles southward of Tanjong Si Api Api, and some houses on piles off Tanjong Sibabi, 1¾ miles farther southward. The settlement at Ledoeng (*see* below) is difficult to distinguish by day, but at night the lights of the houses can be made out and distinguished from those on the fish stakes on the banks of Sungei Ledoeng (Ledung) which discharges southward of the settlement.

A light-buoy, painted white, exhibiting a *white flashing* light *every twelve seconds* (flash *five seconds*), is moored in the approach to Telok Piai, about 6½ miles south-eastward of Tanjong Si Api Api.

Between the banks which dry there are four channels leading to the entrance of Panai rivier, but Telok Piai channel, in which there is a depth of 8 feet (2^m4), is the only one now in regular use. It lies eastward of the outer light-buoy and close eastward of the mudbank extending northward from Tanjong Perapat, the western entrance point of Panai rivier, about 5 miles south-eastward of Tanjong Sibabi, and is partly buoyed.

Koealoe, the westernmost channel, passes westward of the outer light-buoy and leads to the settlement at Ledoeng, situated on the western side of the entrance to Koealoe rivier, 2¼ miles southward of Tanjong Sibabi; this channel, which is not buoyed, has a depth of 9 feet (2^m7) over the bar, about 2 miles north-eastward of the settlement. These channels are liable to change in depth and direction.

A light-buoy, painted white, exhibiting a *white flashing* light *every twelve seconds* (flash *five seconds*), is moored on the western side of the channel leading to Panai rivier, about 6½ cables north-eastward of Tanjong Perapat. This light-buoy is equipped with a reflector.

A beacon, with two reflectors, disposed vertically, marks the western side of the channel between the two light-buoys.

Charts 1355, 748b.

Chart 794.

Tidal streams.—Between Tanjong Si Api Api (*Lat.* 2° *56′ N., Long. 100° 00′ E.*) and the drying banks off the mouth of Panai rivier the in-going stream sets into Telok Piai channel and follows its direction, and the out-going stream sets on to Tanjong Si Api Api. Off Tanjong Pertandangan the out-going stream sets eastward.

Both off and within the river mouths, for some time after the in-going stream has begun to make, the surface water continues to run out while an under-current sets inwards. Outside the 5-fathom (9^{m}1) line northward of the banks the in-going stream sets south-eastward. The greatest rate of the streams outside the 5-fathom (9^{m}1) line is 2 knots, and in the channels and rivers, from 3 to 4 knots. There is very little slack water at springs. Outside, each stream runs for about 6 hours, but farther in the out-going stream runs for 7 hours and the in-going for 5 hours. The streams turn about three-quarters of an hour after high water, and half an hour after low water.

Off Tanjong Perapat and Tanjong Datoe (Datu), a low mangrove point, 3¾ miles south-south-eastward, the in-going stream sets somewhat towards the coast, whilst the out-going stream sets strongly north-westward.

Koealoe rivier.—There is a pier, with a Customs station at its end, at Ledoeng, and in its approach there was, in 1927, a depth of 2 feet (0^{m}6).

Tanjong Ledoeng (Ledung), about half a mile southward of the southern entrance point of Sungei Ledoeng, stands out distinctly. Between the anchorage off Ledoeng and that off Tandjoeng Mengedar, situated about 9 miles farther up, on the right bank of Koealoe rivier, there was, in 1927, a least depth of 4 feet (1^{m}2).

There is regular communication by steamer between Ledoeng and other ports on this coast.

Anchorages.—Directions.—Anchorage may be obtained by vessels with local knowledge, in a depth of about 10 feet (3^{m}0), off Ledoeng. The out-going stream off the mouth of Sungei Ledoeng is strong, especially near the time of low water.

Vessels with local knowledge may also obtain anchorage off the settlement at Tandjoeng Mengedar, in a depth of about 10 feet (3^{m}0).

A vessel approaching Ledoeng from northward should pass from three-quarters of a mile to one mile eastward of the steep-to mud bank extending south-eastward from Tanjong Si Api Api, and keep Tanjong Ledoeng well open of Tanjong Sibabi ; when Tanjong Ledoeng bears 211° she should steer for it on that bearing, until Simendoelang Customs station bears 270°, when she should steer 197°, and as requisite for the anchorage. As this channel is not buoyed and passes between shoals on either side, only vessels with local knowledge should use it.

Panai rivier.—Beacon.—Buoy.—Panai rivier is entered between Tanjong Datoe and Tanjong Bangsi, a low mangrove point, 4¼ miles north-eastward ; about 10 miles within the entrance the river is joined on its left bank by Sungei Bila. The settlement of Laboehan (Labuan) Bilik is situated on the right bank of Panai rivier about 2 miles above the junction of these rivers.

A beacon, equipped with two reflectors, disposed vertically, stands on Tanjong Datoe.

A black can buoy is moored about one mile east-south-eastward of Tanjong Datoe.

Charts 1355, 748b.

Chart 794.

There is a jetty at Njiri, a Customs station, situated about 3 miles southward of Tanjong Datoe.

The shores of the river are mangrove as far as Tanjong Berombang, about 6½ miles south-south-westward of Tanjong Bangsi, and in the bight northward of Tanjong Berang Berang Toenggal (Tungal), the north-western entrance point of Sungei Bila. Loemoet (Lumut), an islet lying in the middle of Panai rivier, 6½ miles southward of Tanjong Datoe (*Lat. 2° 41′ N., Long. 100° 06′ E.*), is covered with high trees.

Anchorages.—Directions.—Anchorage may be obtained by vessels with local knowledge off the village of Berombang, about half a mile northward of Tanjong Berombang, in depths of from 8 to 11 feet ($2^{m}4$ to $3^{m}4$), also off Laboehan Bilik, in depths of from 13 to 15 feet ($4^{m}0$ to $4^{m}6$), about one cable from the eastern bank. The usual berth is off the Customs pier.

A vessel approaching the entrance to Telok Piai channel should steer for the outer light-buoy between the bearings of 220° and 250°. A good lookout should be kept for some fishing stakes situated eastward of the light-buoy. When near this light-buoy she should steer for the inner light-buoy, passing between the two outer lines of fishing stakes, situated north-eastward of Tanjong Perapat. On the bar abreast the inner light-buoy there is a depth of 8 feet ($2^{m}4$). Thence she should steer to pass about 3¾ cables eastward of Tanjong Datoe, and thence westward of the black can buoy. Only vessels with local knowledge should attempt to proceed to Laboehan Bilik.

Settlements.—Laboehan Bilik is the residence of an Administrator, and of the native ruler of Panai. The inhabitants consist of Malays and Chinese.

There is a resident medical officer at Laboehan Bilik.

There is a settlement at Ajer Mera, about 70 miles above Laboehan Bilik, which can be reached by motor launches drawing 6 feet ($1^{m}8$) in the dry season.

There are several rubber plantations on the banks of Sungei Bila, which is shallower than the Panai, and a settlement at Djawi Djawi (Jawi Jawi), 1¾ miles south-westward of Tanjong Berang Berang Toenggal.

There is regular communication by steamer between Berombang, Laboehan Bilik, and other ports on this coast and with Penang.

Charts 794, 795.

Coast.—Between Tanjong Si Api Api and the entrance to Straat Roepat (Selat Rupat), about 95 miles south-eastward, the only points of identification are the river mouths. The coast is mostly muddy, low-lying and uniformly covered with mangroves. The coastal banks, as far out as the 5-fathom ($9^{m}1$) line, are indicated by fishing stakes and enclosures. Fishing boats are met with well out in the offing, and at night carry no lights ; at times they work as far out as close southward of the Aroeah (Aroa) eilanden (page 164).

Chart 794.

The coast between Tanjong Bangsi and Tanjong Pertandangan, about 4 miles eastward, consists of mud, fringed with mangroves. Tanjong Pertandangan is low, but shows up well from northward on account of its high trees. Between these two points a mud bank, which dries, extends 2 miles offshore, and thence to Tanjong Petjoedian (Pechudian), about 12 miles south-south-eastward, it extends about

Chart 794.

three-quarters of a mile, and from Tanjong Petjoedian about 2¼ miles. From the latter point, a spit, with depths of less than 3 fathoms (5ᵐ5), extends about 11 miles northward, nearly parallel to the coast, and, at its southern end, is moderately steep-to.

The mouth of Sungei Sitokan, about 3¼ miles south-south-eastward of Tanjong Pertandangan (*Lat. 2° 42′ N., Long. 100° 14′ E.*), may be identified near low water by a white sandy beach which merges into low muddy ground covered with mangroves, with high trees behind it. Sitokan village, situated at the mouth of Sungei Sitokan, is visible from seaward.

Tanjong Petjoedian is fringed with mangroves, and may be identified by the high trees behind it decreasing suddenly in elevation when near it. Between this point and the village of Penipahan, nearly 4 miles southward, the mud bank, which dries, is continued from north-westward, and extends from 2 miles eastward of the point to 1¼ miles eastward of the village.

Between Penipahan and the entrance to Rokan rivier, about 27 miles south-eastward, there are several unimportant creeks, the mouths of which can only be identified by the fishermen's huts. This coast is fringed with shoals and can only be reached on a rising tide by vessels with local knowledge.

Rokan rivier and approaches.—Lights.—Light-buoys.—Rokan rivier is entered between Groot Halang, an island situated about 25 miles south-eastward of Tanjong Petjoedian, and Tanjong Belanda, about 7½ miles eastward of the island. Its approach is encumbered by mud banks; off Tanjong Belanda, and between it and Tanjong Seneboei (Senebui), 16 miles east-north-eastward, the fringing bank dries to a distance of from about 3 to 4½ miles offshore, and extends with depths of less than 3 fathoms (5ᵐ5) for about 11 miles north-north-westward of this stretch of coast, and for about 19 miles northward of Groot Halang.

Groot Halang is very low and covered with thick vegetation. The passage between it and the main island is only available for small craft with local knowledge on a rising tide; the depths are liable to continual alteration.

A light-buoy, painted in red and black bands, exhibiting a *white flashing* light *every twelve seconds* (flash *five seconds*), is moored about 17 miles northward of Tanjong Belanda.

A light-buoy, painted black, exhibiting a *red flashing* light *every twelve seconds*, is moored 10½ miles north-westward of Tanjong Belanda.

Three white beacons, the outermost situated about 5¼ miles west-north-westward of Tanjong Belanda, each exhibiting a light, at an elevation of 17 feet (5ᵐ2), mark the channel to Bagan Si Api Api, situated 2½ miles southward of Tanjong Belanda.

A light is exhibited, at an elevation of 25 feet (7ᵐ6), from the head of the pier at Bagan Si Api Api.

The passage across the banks to Bagan Si Api Api is greatly encumbered by numerous fishing stakes and large fish enclosures; vessels should give these a good berth. There is no definite channel, as the depths are continually changing, and consequently only small craft with local knowledge should attempt to enter the estuary. In 1932, the least depth over the banks to Bagan Si Api Api was 1½ feet (0ᵐ5), between the inner white beacon and the anchorage.

Charts 1355, 748b.

Chart 794.

Good anchorage may be obtained west-south-westward of the pier at Bagan Si Api Api (*Lat. 2° 10′ N., Long. 100° 48′ E.*).

Tidal streams.—Outside the bank extending from the mouth of Rokan rivier, the in-going tidal stream sets south-eastward, and the out-going stream north-westward. At and near the 5-fathom ($9^{m}1$) line, the tidal streams set along the edges of the shoals at a rate of from 3 to 4 knots at springs; the in-going stream runs from about 3 hours before high water at Bagan Si Api Api to about 3 hours after.

Except for a short period of slack water there is a continual eddy stream, working anti-clockwise, over the middle of the bank; about the time of high water at Bagan Si Api Api this eddy stream sets eastward; 3 hours after high water it sets northward, at low water, westward, and 3 hours after low water, southward, the greatest rate being from 3 to 4 knots.

At neaps, the north and south-going streams predominate; two days after quadrature the east and west-going streams become hardly perceptible, and the north-going stream then runs the longer and at its greatest rate.

Off Bagan Si Api Api both the in-going and out-going streams follow the direction of the mouth of the river and run at their greatest rate immediately after the turn of the tide, the maximum rate at springs being from 3 to 4 knots.

Bagan Si Api Api.—The settlement of Bagan Si Api Api fronts the eastern shore of the mouth of Rokan rivier. There is a pier with a flagstaff at its head. Vessels lying alongside ground at low water on the soft mud, which extends for about 25 yards ($22^{m}9$) from the pier head.

The inhabitants, numbering about 20,000, in 1943, are mostly Chinese fishermen. There is a resident native medical officer.

There is regular communication by steamer with Singapore and Java.

The limits of the roadstead are the parallels about 5½ cables northward and 19 cables southward of the pier and the meridian about 5½ cables westward of the pier.

Chart 1355.

Rokan rivier above Bagan Si Api Api.—Bore.—The river above Bagan Si Api Api is much encumbered with banks, and the channels between them are constantly shifting, rendering navigation hazardous, except to those with local knowledge.

From 3 days before until 3 days after full and change, the in-going stream makes as a bore in the river, attaining a height of about 3 feet ($0^{m}9$), and being experienced between Perdamaran, an island about 6 miles southward of Bagan Si Api Api, and Tanah Poetih (Putih), about 25 miles farther up stream. It travels at a great rate with a thundering noise and does much damage to the praus.

Charts 794, 795.

Coast.—Seneboei (Senebui) is an island just above water, situated close north-westward of Tanjong Seneboei, about a quarter of a mile offshore; it is covered with a low undergrowth, the light colour of which shows up well against the darker growth of the main island. There is a depth of 10 feet ($3^{m}0$) in the channel southward of Seneboei.

The coast between Tanjong Seneboei and Tanjong Ketam, 23 miles south-eastward, is uniformly low and overgrown with mangrove. Good anchorage may be obtained in the channel off this coast.

Charts 1355, 748b.

Charts 794, 795.

Off-lying banks.—Lights.—Buoys.—Between this channel and the fairway of Malacca strait, there are many mud banks, some of which dry, and break occasionally; they are all steep-to and are the continuation south-eastward of the South sands (page 166), as far as and southward of, Pyramid shoal.

A light is exhibited, at an elevation of 38 feet (11^{m}6), from a black iron structure, 29 feet (8^{m}8) in height, 3½ miles north-north-eastward of Tanjong Seneboei.

Chart 795.

Bakal Toea (Tua) bank lies parallel with and about one mile offshore close north-westward of Tanjong Ketam (*Lat. 2° 00′ N., Long. 101° 19′ E.*); it dries at its south-eastern extremity, and has depths of from 1½ to 8 feet (0^{m}5 to 2^{m}4), hard sand, over the remainder.

A black can buoy is moored at the north-western end of Bakal Toea bank, and a white conical buoy about midway between its south-eastern end and the coast south-westward of it. In the channel between this bank and the coast there is a least depth in the fairway of 5 fathoms (9^{m}1) at its south-eastern end.

There is a navigable channel north-westward of Roepat running east and west, which connects the fairway in Malacca strait with the channel along the coast. It is marked at its western end by a white conical buoy surmounted by a ball, situated 6 miles northward of Tanjong Senapies, which lies about 17 miles south-eastward of Tanjong Seneboei, and by two black can buoys each surmounted by a truncated cone, situated 7¾ miles north-north-eastward and 14 miles north-eastward, respectively, of Tanjong Senapies.

A light is exhibited, at an elevation of 35 feet (10^{m}7), from a black iron structure, 26 feet (7^{m}9) in height, in the northern approach to Straat Roepat, about 5¾ miles northward of Tanjong Ketam.

Tidal streams.—Along the edge of the bank westward of Seneboei and in the channel off the coast between Tanjong Seneboei and Tanjong Ketam, the tidal streams run generally fair with the channel, setting south-eastward at a maximum rate of 2 knots, and north-westward at 3 knots. The streams turn about 3 hours after high and low water by the shore.

In the buoyed channel north-westward of Roepat, the streams set from east to east-north-east and from west to north-west at a maximum rate of 2 knots; the irregular outline of the shoals, however, causes deflections of the stream, so that caution is necessary. The stream turns about 3 hours after high and low water by the shore.

Near the banks off the northern entrance to Straat Roepat, the tidal streams set diagonally across, from and to Bakal Toea bank.

Islands and dangers.—Roepat (Rupat) and Medang are two islands separated from one another by Selat Morong, a tortuous strait about one cable wide and of no importance to navigation; the greater portion of the islands is morass with mangrove coasts and high trees within. Roepat is separated from the Sumatra coast by Straat Roepat.

From the northern side of Roepat and the north-western side of Medang, foul ground, with many patches which dry, extends as far northward as the parallel of Tanjong Medang, the northern extremity of Medang.

Between Tanjong Mambol (*Lat. 2° 00′ N., Long. 101° 24′ E.*), the eastern entrance point of the northern end of Straat Roepat, and the

Charts 1355, 748b.

Chart 795.

entrance to Sungei Nion, 7½ miles east-north-eastward, the coast is overgrown with trees. The entrance to Sungei Nion is blocked by a mud flat, and in the approach to Selat Morong there is a depth of 2 feet ($0^{m}6$). Babi, an overgrown islet, lies 3¾ miles north-north-eastward of the entrance to Sungei Nion; between this islet and the north-western side of Medang, there is a channel with a least depth of 4¾ fathoms ($8^{m}7$) at its western end, but nearly dries at its eastern end. Boesoeng (Busung) Asoh, a sand flat, which dries, and is steep-to, lies about 3 miles east-north-eastward of Babi. Boeroeng (Burung), an overgrown islet, with several huts and casuarina trees on its northern side, lies about one mile westward of Tanjong Medang.

On the north-eastern side of Medang there are some sandy beaches, casuarinas and small villages in places; of these latter, Batoe (Batu) Mamong, 11½ miles south-eastward of Tanjong Medang, is inhabited mostly by Chinese, and is visible some distance.

A bank, which dries on its outer side, extends 1½ miles offshore about 3 miles south-south-eastward of Tanjong Poenah (Punah), situated 3½ miles south-eastward of Tanjong Medang. For bank extending from the eastern side of Roepat, *see* page 89.

Straat Roepat.—Dangers.—Buoys.—Tanjong Ketam, the western entrance point of the northern end of Straat Roepat (Selat Rupat), is low and sandy, and has some houses and coconut palms on it.

About 7 miles south-south-eastward of Tanjong Ketam is the island of Ketam, and farther southward are Atong, Pajoeng (Pajung), Mampoe (Mampu), Rampang and Djentileh (Jentileh), all of which are low, but covered with high trees.

The whole of the southern shore of the strait is densely wooded. On the northern side, about 4 miles eastward of Tanjong Kapal, the south-western point of Roepat, is the village of Batoe Pandjang (Batu Panjang), which is noticeable; on the southern side, about 12 miles westward of Tanjong Lebang or Moeramboeng, the southern entrance point of the eastern end of the strait, is Poeah (Puah) village.

The least depth in the strait is 2¾ fathoms ($5^{m}0$) on the bar between the southern end of Ketam and the coast of Sumatra. The shoals which encumber the northern entrance of Straat Roepat have deep channels between them; their positions can be best seen on the chart.

A white conical buoy is moored about one mile off the north-western side of Roepat, nearly 5 miles north-north-eastward of Tanjong Mambol.

In the eastern part of the strait, two shoals with a depth of 4¾ fathoms ($8^{m}7$) between them, extend about 5½ miles westward from Tanjong Tegoh, the southern extremity of Roepat. The western shoal, which has a least depth of 5 feet ($1^{m}5$), lies nearly one mile from the northern side of the strait, and the eastern shoal has a least depth of 3 feet ($0^{m}9$). From the opposite side of the strait, northward of Poeah, a bank, with depths of from 3 to 5 fathoms ($5^{m}5$ to $9^{m}1$), extends about 1½ miles, leaving a deep channel nearly one mile wide between it and the western shoal on the northern side mentioned above.

A shoal, which dries, lies with its outer edge about 1¾ miles south-eastward of Tanjong Masim (*Lat. 1° 45′ N., Long. 101° 42′ E.*), the south-eastern extremity of Roepat. For the bank extending eastward from the same point, *see* page 89. A narrow shoal, with a least depth of 1¼ fathoms ($2^{m}3$), lies parallel with the coast of Sumatra, and extends

Charts 1355, 748b.

Chart 795.

from about 5 to 14 miles south-eastward of Tanjong Masim, leaving a deep channel about 1¼ miles wide between it and the coast. Its south-eastern end is marked by a black can buoy.

Directions.—As Straat Roepat is not buoyed it should only be used by vessels with local knowledge. The channel generally used is along the coast of Sumatra for the whole distance from Tanjong Seneboei to Tanjong Lebang, passing inside Bakal Toea bank and westward of all the islands in the strait.

Tidal streams.—In Straat Roepat, southward of the islands, the east-going stream attains a rate of 2 knots, and runs from 4 to 5 hours; the west-going stream attains a rate of 3 knots, and runs from 7 to 8 hours. Off the eastern entrance the west-going stream often sets on to the coast of Sumatra.

Straat Bengkalis and approach.—Dangers.—Buoy.—Straat Bengkalis (Brewer strait) lies between the south-western side of Bengkalis and Sumatra, and is entered westward of Tanjong Djati (Jati), the western extremity of Bengkalis, situated about 19 miles south-eastward of Tanjong Masim. The approach from northward is deep and presents no difficulty, but it is not advisable to enter without local knowledge.

The western shore of the approach, from the north-eastern point of Roepat to Tanjong Masim, is covered with low trees and brushwood, and is inundated at high water; within are tall trees. This stretch of coast is fringed by a bank, with depths of less than 3 fathoms ($5^{m}5$), extending as much as 7 miles offshore at its southern end.

Shoals, with depths of from 2½ to 5 fathoms ($4^{m}6$ to $9^{m}1$), extend 18 miles north-north-westward from Tanjong Djati; their positions can be best seen on the chart.

A black can buoy, surmounted by a truncated cone, marks the western edge of some 2½-fathom ($4^{m}6$) patches, about 5 miles north-westward of Tanjong Djati (*Lat. 1° 37′ N., Long. 101° 59′ E.*).

Chart 1355.

Southward of Tanjong Balai, 31 miles south-eastward of Tanjong Lebang, Straat Bengkalis is known as Straat Lalang, and leads southward of the island of Padang and thence into Straat Pandjang (Selat Panjang) southward of Tebing Tinggi, and has considerable depths for about 60 miles, beyond which there are islets and shoals encumbering the strait. *See* page 94.

Siak rivier branches off in a southerly direction at Tanjong Lajang, 9 miles southward of Tanjong Balai. *See* page 90.

Chart 795.

Directions.—The approach from northward is along the north-eastern coast of Medang, where there are considerable depths outside a distance of 1½ miles. From a position about 3 miles eastward of Batoe Mamong, situated about 12 miles south-eastward of Tanjong Medang, a vessel should steer to pass westward of the black can buoy north-westward of Tanjong Djati, thence into Straat Bengkalis.

From eastward, the vessel may pass on either side of Rob Roy bank (page 171), if not approaching through Straat Padang (page 91).

Bengkalis.—Off-lying dangers.—Bengkalis is an island uniformly covered with vegetation. The northern coast is fronted by shallow ridges running parallel with it, with mostly greater depths between them, and should be given a wide berth. Bantan Tengah village is

Charts 1355, 748b.

Chart 795.

situated about midway between Tanjong Djati (*Lat. 1° 37′ N., Long. 101° 59′ E.*) and Tanjong Parit, the north-eastern extremity of the island. During May and November, numerous praus fish off this coast.

A shoal, with a depth of 2½ fathoms ($4^{m}6$), lies about 6½ miles northward of Bantan Tengah.

The east coast is fringed by a bank of mud and sand, which is steep-to, extending about 3 cables offshore. Sungei Kemboeng (Kembung) discharges 1¾ miles southward of Tanjong Sedekip, which lies 3¾ miles south-south-eastward of Tanjong Parit.

Several shoals, with depths of from 3¾ to 4¾ fathoms ($6^{m}9$ to $8^{m}7$), lie from 1½ to 2½ miles off this coast. From the south-eastern extremity of Bengkalis, on which stands the village of Sekoedi, a spit, with a depth of 1½ feet ($0^{m}5$), extends about half a mile southward, and a 3¼-fathom ($5^{m}9$) patch lies about one mile southward of the point.

For the light structure off the south-eastern extremity of Bengkalis, *see* page **91**.

Between the east coast of Bengkalis and Long bank (page **177**), in Malacca strait, there are several narrow sand ridges, following the trend of the coast and channel, with least depths of about 2 fathoms ($3^{m}7$), the positions of which can best be seen on the chart.

Tidal streams.—The tidal streams set along the northern side of Bengkalis and Rangsang, an island south-eastward of it, following the line of the ridges north-eastward of them, setting from east to east-south-east, at a rate of 2 knots at springs, and from west to north-west, at 3 knots. At neaps, both streams are weak off Bengkalis, but have a rate of from one to 1½ knots off Rangsang. In the bight between these two islands the stream sets into and out of it.

In Straat Bengkalis, the south-east-going stream begins to make about 2 hours after low water by the shore, and may attain a rate of more than 2 knots. The north-west-going stream makes 2 hours after high water, and at times attains a rate of 3 knots.

Bengkalis settlement.—Light.—Bengkalis settlement is situated on the north-eastern side of Straat Bengkalis, about 11 miles south-eastward of Tanjong Djati. It is the headquarters of an Administrator and there is a resident medical officer.

Vessels may obtain anchorage anywhere in the approach channel from northward, or off the settlement, with a good holding ground of mud, sand, and stiff clay.

There are two piers at Bengkalis, at the head of the south-eastern of which there is a depth of 2¾ fathoms ($5^{m}0$).

A light (*Lat. 1° 28′ N., Long. 102° 06′ E.*) is exhibited from the head of the north-western pier.

The limits of the roadstead, which extends about 8¼ cables offshore, are the meridians about 5½ cables eastward and westward, respectively, of the Government pier.

There is regular communication by steamer with other ports on the coast of Sumatra.

Chart 1355.

Siak rivier.—Siak rivier, about one mile wide at its entrance, is navigable only by small craft with local knowledge. The least depth, in 1946, was 15 feet ($4^{m}6$) off Tengah island, about 5 miles inside the entrance ; elsewhere, as far as Pakan Baroe, about 90 miles from the

Charts 1355, 748b.

Chart 1355.

mouth, there are depths of from 5 to 8 fathoms ($9^{m}1$ to $14^{m}6$). The banks of the river as far as Siak, about 40 miles from the entrance, are mostly low and swampy. At Siak the river is about 1½ cables wide, and at Pakan Baroe three-quarters of a cable; at the latter place vessels of 300 feet ($91^{m}4$) in length can turn.

At Pakan Baroe there is a wharf, 150 feet ($45^{m}7$) long, and about one mile below it there are two wharves on the left bank, one about 150 feet ($45^{m}7$) long, and the other 250 feet ($76^{m}2$).

Siak is the residence of an Administrator.

Tebing Tinggi, a small settlement, is situated on the right bank of the river, on a hill, about 100 feet ($30^{m}5$) high, 38 miles above Siak.

Pakan Baroe is the principal trading station between the east and west coasts of Sumatra. The population, in 1946, was about 4,500.

The limits of the roadstead are the meridians, about 2¾ cables each side of the Government pier.

Above Pakan Baroe, the river has sharp bends, and is encumbered with overhanging trees, which makes navigation difficult.

There is regular communication by steamer between Pakan Baroe and Singapore, calling at Siak.

Tidal streams.—During the dry season the influence of the tidal stream is felt above Pakan Baroe, and in the wet season, just below it. The period of slack water is usually very short. As far as Siak, the in-going stream runs for 5 hours and the out-going stream for 7 hours, the greatest rate at springs being 2 and 3 knots, respectively. At neaps, the in-going stream runs for 4 hours and the out-going stream for 8 hours, with maximum rates of about one knot and 2½ knots, respectively.

On the upper river, owing to seasonal conditions, slack water may last for the whole 24 hours.

Chart 795.

Straat Padang.—Light.—Straat Padang or Koedap, the channel between the islands of Bengkalis and Padang, is much used by small craft trading between Singapore and Bengkalis; it has a least width of 6 cables, with depths of from 3¼ to 7 fathoms ($5^{m}9$ to $12^{m}8$) in the fairway throughout. At the south-eastern entrance the channel is contracted to a width of about 3½ cables between the 3-fathom ($5^{m}5$) lines by shoals extending from either side.

From Tanjong Padang (*Lat. 1° 25′ N., Long. 102° 12′ E.*), the southern entrance point of the western end of the strait, a spit, with a depth of 1¾ fathoms ($3^{m}2$) at its outer end, extends 2½ miles westward, and for a distance of 1¼ miles from the point it dries.

Dedap, a wooded islet, with a sandbank extending about 2 cables south-eastward from it, lies on the south-western side of the strait about 9 miles from the south-eastern entrance point. The deeper channel lies north-eastward of it.

A light is exhibited, at an elevation of 38 feet ($11^{m}6$), from a white iron beacon, 29 feet ($8^{m}8$) in height, about half a mile south-south-eastward of the south-eastern extremity of the island of Bengkalis.

Tidal streams.—In Straat Padang the east-going stream has a maximum rate of 2 knots and makes about 2 hours after low water; the west-going stream has a maximum rate of 3 knots, and makes about 2 hours after high water. Towards neaps the streams are very weak, but the west-going stream predominates.

Charts 1355, 748b.

Chart 1355.

Straat Asam.—Straat Asam, between Padang on the west and Merbau and Tebing Tinggi on the east and south, respectively, has a least width of about three-quarters of a mile, and a least depth of about $6\frac{1}{2}$ fathoms ($11^{m}9$) in its northern approach. The shores are steep-to, except off the northern entrance point at its southern end, where it joins Straat Lalang and Straat Pandjang ; here a spit, with a depth of $4\frac{1}{4}$ fathoms ($7^{m}8$) at its outer end, extends nearly one mile southward.

The village of Meranti Boenting (Bunting) is situated on the south-eastern extremity of Padang (*Lat. 0° 57′ N., Long. 102° 29′ E.*).

Straat Lalang and Straat Pandjang.—Straat Lalang is from $2\frac{1}{4}$ to 4 miles wide, and has a least depth of 6 fathoms ($11^{m}0$) in the fairway, but there is a ridge, with a depth of $4\frac{1}{4}$ fathoms ($7^{m}8$) near the middle of the strait abreast Makapan settlement, on the west bank, about 15 miles southward of Tanjong Lajang.

Straat Pandjang, has a width of from $1\frac{1}{2}$ to $3\frac{1}{4}$ miles, but the navigable channel at the eastern end, where it is encumbered with shoals and islets, is considerably less.

These passages are only used by local vessels and are of little importance.

Tidal streams.—In Straat Lalang and Straat Pandjang the tidal streams turn from 2 to $2\frac{1}{2}$ hours after high and low water by the shore. The south-east and east-going streams have a maximum rate of $3\frac{1}{2}$ knots,. and set along the coast of Sumatra into Kampar rivier, about 14 miles south-eastward of the eastern entrance to Straat Pandjang. The west and north-west-going streams have a maximum rate of 4 knots, being strongest near the eastern end of Straat Pandjang.

Straat Ringgit.—Straat Ringgit, between the south-eastern side of Merbau and the north-western end of the island of Tebing Tinggi, has a least width of about a quarter of a cable, and depths of from $2\frac{3}{4}$ to 7 fathoms ($5^{m}0$ to $12^{m}8$). At both ends of the strait vessels should close the northern shore.

Directions.—Vessels bound for Bengkalis settlement from Malacca strait may pass close along the eastern side of the island of Bengkalis, round the light-structure at its south-eastern end, taking care to avoid the $3\frac{1}{4}$-fathom ($5^{m}9$) patch southward of it, if necessary, and through Straat Padang.

Merbau and Rangsang.—The north-eastern coast of Merbau, between Tanjong Bohmat, its northern extremity, and Tanjong Koengkoeng (Kong Kong), its eastern extremity, is fringed by a mud bank, which extends about $6\frac{1}{2}$ miles northward with depths of less than 3 fathoms ($5^{m}5$), and which dries to a distance of about one mile offshore between Tanjong Bohmat and Tanjong Keramat (Selanchor), $3\frac{1}{2}$ miles east-south-eastward.

Between this bank and that which extends from the north-western side of Rangsang is the western fairway into Straat Koengkoeng, which leads into Straat Ajer Hitam (Selat Ayer Itam). In the northern part of the fairway are several narrow banks, trending northward and southward, with depths of from 5 feet to $2\frac{3}{4}$ fathoms ($1^{m}5$ to $5^{m}0$).

The northern and north-eastern coasts of Rangsang are fringed by a mud bank, which dries for a distance of from 2 to 4 cables offshore ; and shoals, with depths of from $1\frac{3}{4}$ to 3 fathoms ($3^{m}2$ to $5^{m}5$), extend about 8 miles north-eastward of these coasts. The eastern coast is

Charts 2660a, 748b.

Chart 1355.

low and densely wooded. There is a village on the north-eastern side of the island, 8 miles south-eastward of Tanjong Kedaboe, the north-eastern point. There are numerous fishing stakes extending three-quarters of a mile offshore between Tanjong Kedaboe and Tanjong Medang Kaloewar (Kaluwar), the eastern extremity of the island.

Straat Koengkoeng and Straat Ajer Hitam.—Buoy.—Straat Koengkoeng, entered between Merbau and the western end of Rangsang, should not be used by vessels without local knowledge. A bank, which dries, extends nearly one mile from the western end of Rangsang, and on it, about 4 miles north-north-eastward of Tanjong Ajoeng (*Lat. 1° 01′ N., Long. 102° 37′ E.*), the western extremity of the island, is the islet of Soekel (Sukel); except for this bank the strait is clear of dangers.

At Tanjong Majan, about 7 miles eastward of Tanjong Ajoeng, Straat Koengkoeng leads into Straat Ajer Hitam, which separates Rangsang from the northern side of Tebing Tinggi; it has a least depth of 4¼ fathoms ($7^{m}8$) in the fairway at its south-eastern end.

The south-eastern outlet is divided into two channels by the islands of Manggoeng (Mangung) and Topang, one running east, and the other south. In the former, which is barely 3½ cables wide, the least depth is about 3¼ fathoms ($5^{m}9$) at its eastern end, and in the southern and wider channel, a least depth of 3 fathoms ($5^{m}5$) can be carried by keeping close to the western and southern sides of Topang.

A bank, with depths of less than 3 fathoms ($5^{m}5$), extends about 2¼ miles eastward from Manggoeng and Topang.

Close to the south-eastern end of Tebing Tinggi there is a narrow channel, with a least depth of 2½ fathoms ($4^{m}6$), leading into the eastern end of Straat Pandjang.

Sungei Soedoer (Sudur) and Sungei Soewir (Suwi) discharge into the northern and southern sides, respectively, of the north-western end of Straat Ajer Hitam. The north-western part of the strait is the most densely populated.

Tidal streams.—In Straat Koengkoeng and Straat Ajer Hitam the south-east-going stream makes about 2 hours after low water, and the north-west-going stream at about 2 hours after high water, at a rate of 2½ and 4 knots, respectively, at springs. At neaps both streams are very weak, the north-west-going stream being the stronger.

Settlement.—Light.—About 5 miles eastward of the western entrance of Straat Koengkoeng, on the southern shore, is the settlement of Selat Pandjang (Tebing Tingi), at which there is a pier with a **T**-head, with a depth of about 20 feet ($6^{m}1$) alongside.

A light is exhibited, at an elevation of 21 feet ($6^{m}4$), from the head of the pier at Selat Pandjang.

There is a resident medical officer here.

There is regular communication by steamer with other ports in Sumatra.

Charts 1355, 2060a.

Eastern approach to Straat Pandjang and Straat Ajer Hitam.—In the eastern approach to Straat Pandjang are the low, densely wooded islands of Serapoeng (Serapung), Leboe (Lebu), and Mendol, on which are some sawmills. There is an islet close off the north-western side of Mendol, which is gradually increasing in size. At the village of Bandong, on the south-eastern side of Mendol, there is a landing stage.

Charts 2660a, 748b.

Charts 1355, 2060a.

The village of Serapoeng, on the eastern side of the island of the same name, 2½ miles from its southern extremity, may be identified by the red roof of the Customs station. Natives with local knowledge of the channels may be obtained at these villages.

Chart 1355.

A shoal, with a least depth of one foot (0^{m}3) at its south-western extremity, extends from about 5 to 12 miles north-eastward from the northern extremity of Leboe. Close northward of this shoal, a narrow ridge extends about 2¾ miles northward, and parallel with, at a distance of 4 miles from the south-eastern end of Rangsang. About 1½ miles southward of the northern extremity of the ridge is Boeroeng (Burung), an islet covered with tall trees, and fringed with rocks above and below water. About 1¼ miles northward of Boeroeng (*Lat. 0° 51′ N., Long. 103° 14′ E.*) is Belembang, a low islet covered with scrub, and also surrounded by rocks above and below water. A rock, awash, lies nearly one mile north-north-eastward of Belembang. A rock, with a depth of 2½ fathoms (4^{m}6), lies about 4 cables north-north-eastward of the rock, awash.

Charts 1355, 2660a.

Tidal streams.—The tidal stream setting southward along the eastern side of Rangsang is joined by the east-going stream from Straat Ajer Hitam, and together set along the eastern side of Topang at a maximum rate of 2 knots and on either side of Mendol into Kampar rivier. Along the western side of Mendol its greatest rate is 4 knots, and in the narrows southward of the island, 6 knots.

Soon after high water the stream sets out of Kampar rivier, and divides off the southern extremity of Mendol. The branch that sets along the south-eastern side of this island, at a maximum rate of 4 knots, unites with the then north-west and north-going main stream westward of Koendoer.

The other branch becomes dispersed off the south-western side of Mendol, one portion curving round the coast of Sumatra into Straat Pandjang, and the remainder running northward along the western side of Mendol at a maximum rate of 4 knots.

Chart 2660a.

Kampar rivier.—Kampar rivier discharges south-westward of Mendol, the main channel of approach passing along the southern side of that island, thence along the right bank as far as the islet of Moeda, 18 miles up-stream. Owing to the bore which takes place and the rapid tidal streams, local knowledge is necessary.

Chart 1355.

Channel westward of Koendoer.—Islets and dangers.—The channel westward and south-westward of Koendoer (Kundur) is encumbered with several islets and dangers and is seldom used. Lalang is a high, rocky islet covered with low trees, and surrounded by reefs, lying 4 miles north-westward of Tanjong Poenggai (Pungi), the western extremity of Koendoer. A detached reef, with a depth of 8 feet (2^{m}4), lies about 1¼ miles east-north-eastward of Lalang, with a 2¾-fathom (5^{m}0) patch about midway between them. A 2½-fathom (4^{m}6) patch lies about 8 cables north-north-eastward of the islet. A rock, above water, which is difficult to distinguish at high water, lies about one mile westward of Lalang.

A shoal, with a depth of 13 feet (4^{m}0), and a shoal, with a depth of

Charts 2660a, 941a, 748b.

Chart 1355.

10 feet ($3^{m}0$), lie about 2¼ miles south-south-westward and 1¼ miles southward, respectively, of Lalang, and a rock awash lies 3½ miles southward of the same islet. Roesah (Rusah), a rocky islet, covered with high trees, lies 6 miles southward of Lalang, and in the fairway between Mendol and Koendoer leading into Straat Doerian. A 2½-fathom ($4^{m}6$) patch lies about three-quarters of a mile north-north-westward of Roesah (*Lat. 0° 43′ N., Long. 103° 16′ E.*). Toeroes (Turus) and Batoe Landjang, awash, lie one mile and 2¾ miles south-south-eastward, respectively, of Roesah. Between Toeroes and Batoe Landjang on the west, and Koendoer on the east, there is a ridge which dries at its south-eastern end, extending about 2½ miles north-westward from a position about 2 miles eastward of Batoe Landjang.

About 2 miles south-eastward of Batoe Landjang is a rock which dries only at very low tides, and about 1¾ miles farther south-eastward is a rocky islet, covered with scrub.

Between these dangers and the north-eastern side of Mendol, there is a passage clear of dangers.

Tidal streams.—The tidal streams in the channel westward and southward of Koendoer occasionally attain a rate of from 2 to 3 knots, the streams setting southward and south-eastward and in the opposite directions.

Charts 2403, 1355.

Straat Gelam.—Light-buoy.—Straat Gelam, the fairway between the islands of Koendoer, Toelang (Tulang), and Parit, on the south, and Groot Karimoen (Great Karimun), on the north, is the route taken by local craft trading between Singapore and Bengkalis (page **90**) via Straat Ajer Hitam. It is divided at its western end into two channels by the islet of Babi, 257 feet ($78^{m}3$) high. The northern channel has a least depth of 4¾ fathoms ($8^{m}7$) in the fairway, and is marked on its southern side by a black can buoy, 3 miles north-north-westward of Babi, and a light-buoy, painted black, exhibiting a *white flashing* light *every twelve seconds* (flash *five seconds*), about 1¼ miles north-eastward of the northern extremity of Babi. The southern channel has greater depths, but is more encumbered with shoals and is not buoyed.

Chart 1355.

Tambelas (Temblas), an island 257 feet ($78^{m}3$) high, and densely wooded, lies 3¼ miles west-north-westward of Babi ; it has three peaks and from a distance appears as two islands. A shoal, with a least depth of 3¼ fathoms ($5^{m}9$), lies about half a mile north-eastward of Tambelas, and a spit, with a depth of 2¾ fathoms ($5^{m}0$), extends about three-quarters of a mile southward from the south-eastern extremity of the island.

Kenipaän, an island, lies about 2½ miles south-westward of Babi ; between them and also between it and the northern extremity of Koendoer, are several islets and much foul ground.

Chart 2403.

Merak, an island, 225 feet ($68^{m}6$) high, lies near the middle of a bank, over which there are depths of from 4 to 12 feet ($1^{m}2$ to $3^{m}7$), on the northern side of the strait.

The southern side of the strait eastward of the islet of Songkop, situated about one mile south-south-eastward of Babi, is free from danger, but patches with depths of 10 and 13 feet ($3^{m}0$ and $4^{m}0$), lie between the two islets.

Charts 1355, 2660a, 941a, 748b.

Chart 2403.

On the northern side of the strait, about a quarter of a mile southward of Tandjoeng Balai (*Lat. 0° 59′ N., Long. 103° 26′ E.*), situated about three-quarters of a mile south-westward of Tanjong Ramboet (Rambut), the south-eastern extremity of Groot Karimoen, is a sunken rock.

In the eastern approach to Straat Gelam there are several shoals, with depths of from 3 to 5 fathoms ($5^{m}5$ to $9^{m}1$), the positions of which can best be seen on the chart. In the north-eastern approach, about 2¾ miles north-eastward of Tanjong Ramboet, is a shoal, with a least depth of 3 feet ($0^{m}9$).

Tidal streams.—In Straat Gelam, the tidal streams set eastward and westward at a rate of 3 knots at springs and one knot at neaps. The streams turn some hours after high and low water.

Tandjoeng Balai anchorage.—Directions.—Anchorage may be obtained off the settlement of Tandjoeng Balai, southward or south-westward of the pier, in depths of from 10 to 15 fathoms ($18^{m}3$ to $27^{m}4$). Small craft may anchor closer inshore between the pier and the sunken rock southward of it. These anchorages, however, are not good on account of the strong tidal streams and heavy squalls. Approaching from eastward, the ridge of hills eastward of the settlement is noticeable for the red colour of its steep barren sides.

An Administrator resides at the settlement. The inhabitants are mostly Chinese. About 2½ miles westward of the settlement is the village of Pemeral.

Charts 2403, 1355.

A vessel approaching Straat Gelam from south-westward, after rounding Belembang, may steer to pass south-eastward of Tambelas, and thence through the channel to the anchorage. Vessels with local knowledge may use the channel southward of Babi.

Karimoen eilanden.—Koendoer eilanden.—These groups consist of about 10 islands and about 30 islets. They differ widely in character from the low marshy islands of the east coast of Sumatra described in the preceding pages ; they are hilly, and, having a very fertile soil, are more densely populated. They are surrounded by reefs and shoals, most of which wholly or partly dry.

Chart 2403.

Groot Karimoen is mountainous at its northern end, the principal peaks being Betina, 1,363 feet ($415^{m}4$) high, 1¾ miles south-westward of the northern extremity, and Djantan (Jantan), 1,480 feet ($451^{m}1$) high, about 1¼ miles southward of Betina. *See* views facing this page. The southern end of the island, except near Tandjoeng Balai, is low and swampy ground. The surrounding islets are rocky and thickly overgrown.

On the eastern side of Groot Karimoen a bay is formed between the north-eastern point of the island and Tanjong Sebatak, about 5 miles south-south-eastward ; it is filled by a shallow mud bank which extends about one mile offshore, out to the line of its entrance points.

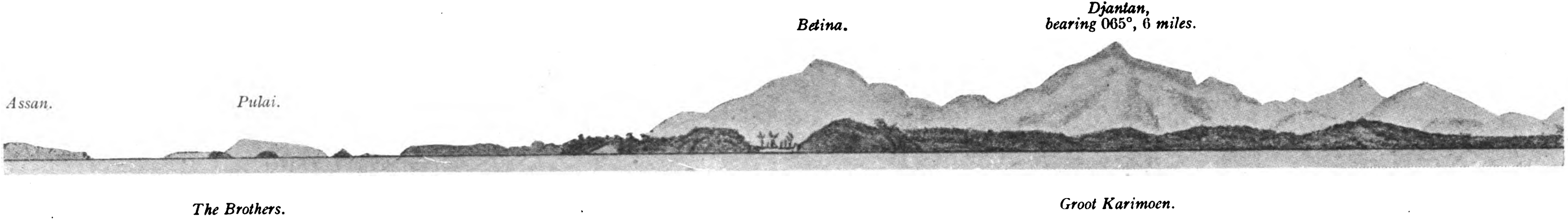
Chart 3833.

On the north-eastern extremity of the island is a pier, 115 feet ($35^{m}0$) long, with a depth of 3¾ fathoms ($6^{m}9$) alongside. A bank, which dries, extends offshore, northward of the pier.

Klein Karimoen (Little Karimun), separated from the north-eastern side of Groot Karimoen by a deep channel, 4½ cables wide, is a bold island, 1,236 feet ($376^{m}8$) high.

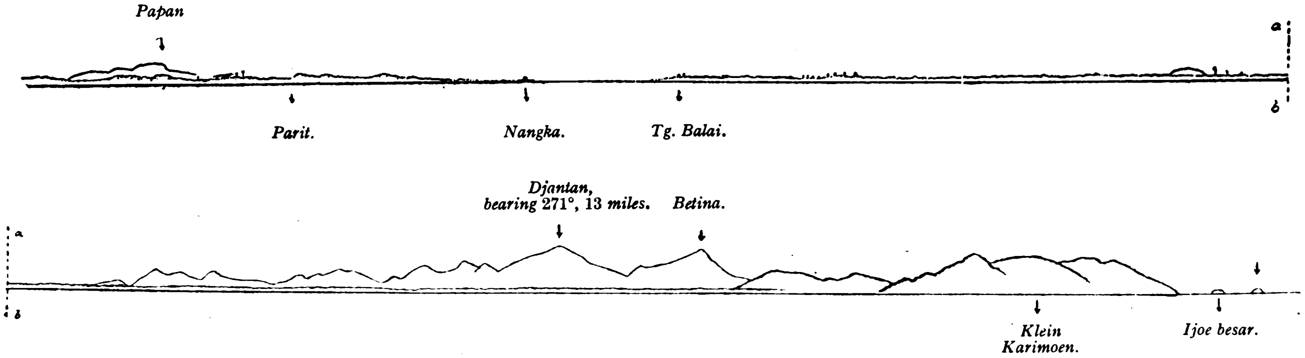
Charts 1355, 3543, 2660a, 941a, 748b.

To face page 96.



North-western approach to Straat Gelam.

(*Original dated* 1902.)



View, in two parts, of north-eastern approach to Straat Gelam.

(*Original dated* 1920.)

Chart 3833.

From the north-western side a bank, with depths of less than 5 fathoms (9^{m}1), extends about 1½ miles westward.

In the north-western approach to the channel between Groot Karimoen and Klein Karimoen are two islets, Nangoi (*Lat. 1° 10′ N., Long. 103° 21′ E.*), 123 feet (37^{m}5) high, about 1¼ miles westward of the north-western extremity of Klein Karimoen, and Toentoen (Tuntun), a moderately steep-to islet, nearly one mile south-westward of Nangoi. In the channel close to the south-western side of Klein Karimoen is a rock above water, which narrows the channel to about 3 cables. At the southern end of the channel, in mid-stream, is Petera, about 30 feet (9^{m}1) high.

Chart 2403.

From the southern side of Klein Karimoen, a bank, with depths of 5 feet (1^{m}5), extends about one mile south-south-eastward, and continues in the same direction, parallel to the coast of Groot Karimoen, for a further distance of about 10 miles, with depths of from 3¾ to 5 fathoms (6^{m}9 to 9^{m}1) ; near its southern end there is a depth of 3 feet (0^{m}9), which has been mentioned on page **96**.

Chart 795.

About 1¼ miles off the north-western side of Groot Karimoen are Assan and Moedoe (Mudu), rocky and thickly overgrown islands, 271 and 212 feet (82^{m}6 and 64^{m}6) high, respectively. Sadjoeda (Sajuda), a rock above water, lies about half a mile northward of Assan, and Seal rock lies about half a mile north-eastward of Sadjoeda. Tokong Belanda, a low rock, lies one mile west-north-westward of the north-western extremity of Assan.

Moedoe lies about one mile south-south-westward of Assan. Reefs extend about half a mile from its north-western and western sides. A 3-fathom (5^{m}5) patch lies about 1¼ miles westward of the northern extremity of Moedoe. A reef, which dries, extends 7 cables south-south-westward from the island.

For Ijoe besar and Ijoe kechil (Pulau Hiju), about 2¾ miles north-westward of the northern extremity of Klein Karimoen, *see* page **177**, and for the islands south-eastward of Koendoer, *see* Eastern Archipelago Pilot, Vol. IV.

Tidal streams.—In the passage between Groot Karimoen and Klein Karimoen, the tidal streams attain a rate of 4 knots at springs.

Charts 1355, 3543, 2660a, 941a, 748b.

CHAPTER IV

MALACCA STRAIT, NORTHERN APPROACH—MALAY OR EASTERN SHORE, FROM GOH PUKET TO PENANG

Chart 842.

GOH PUKET.—Goh Puket or Salang island, belonging to Siam, and separated from the Malay peninsula by Chong Parkprah, is divided into two Rajahships of about equal size, the northern being named Salang, and the southern Puket. The principal towns are Puket or Tongkah, on the south-eastern side of the island, and Tharúa, on the eastern side. The inhabitants are Siamese, Malays and Chinese. The island is rich in tin mines.

Local weather.—*See* page 28.

Western side of Goh Puket.—The western side is indented by several bays with anchorage depths, but none afford any protection during the South-west monsoon. The northern part of this coast, except for a small portion about 7 miles southward of the northern extremity, is low and wooded, with hills, of from about 460 to 840 feet ($140^{m}2$ to $256^{m}0$) high, immediately within it. The southern part is a range of mountains, from about 1,000 to 1,700 feet ($304^{m}8$ to $518^{m}2$) high, densely wooded, and sloping gradually at its northern and southern ends.

Goh Gavai (*Lat. 8° 02′ N., Long. 98° 16′ E.*) are two islets, one of which is 50 feet ($15^{m}2$) high, the other low, lying close together, about 2½ miles south-south-westward of Lem Sai, situated 7¾ miles southward of the northern extremity of Goh Puket, and three-quarters of a mile offshore.

Chong Parkprah.—Dangers.—Chong Parkprah is about a quarter of a mile wide at its entrance, and is much used by small craft. The natives are very superstitious about this strait, its name signifying " Lord's mouth." The land on both sides is mostly low and wooded, but the points are high, and within the northern shore are hills of moderate elevation. A conical hill, about 200 feet ($61^{m}0$) high, lies close within Lem Pak Phra, the northern entrance point. There are several villages along both shores of the strait.

A reef of rocks, only visible at low water, extends a short distance south-westward from Lem Pak Phra, and shallow and shifting sandbanks front both the entrance points. In the South-west monsoon the sea breaks entirely across the entrance, but in the North-east monsoon it is generally smooth. The depth on the bar is subject to great changes varying from one to 3 fathoms ($1^{m}8$ to $5^{m}5$), and the channel is tortuous

Charts 830, 70, 748b.

Chart 842.

and difficult. The strait is encumbered with many dangers, and only small craft with local knowledge should attempt to enter it. There are several islets at the eastern entrance of the strait, the largest of which, situated about 3¼ miles eastward of Lem Asam, situated on the northern side about 8 miles south-eastward of the western entrance, is 231 feet ($70^{m}4$) high.

Anchorages.—Good anchorage may be obtained by vessels with local knowledge inside the bar, in depths of 5 or 6 fathoms ($9^{m}1$ or $11^{m}0$) ; thence to Lem Khun, on the southern side of the strait, about 3½ miles within the entrance, there is a good channel with depths of from 4 to 6 fathoms ($7^{m}3$ to $11^{m}0$).

Good anchorage may also be obtained by vessels with local knowledge, eastward of two islets lying on the western side of the fairway about 2½ miles south-south-eastward of Lem Khun, in depths of from 4 to 5 fathoms ($7^{m}3$ to $9^{m}1$).

Tidal streams.—The flood stream sets in from both ends of Chong Parkprah and meets off Lem Khun ; the ebb stream runs out of both entrances. In the middle of the strait the tidal stream is very weak, but at the western entrance it sometimes attains a rate of 6 knots, while at the eastern entrance it has generally about half that rate.

Southern side of Goh Puket.—Coast.—Light.—About 6½ cables southward of Lem Voalan, the southern extremity of Goh Puket, is Goh Keo Jai, on the north-western extremity of which are two white pagodas. Between this islet and Lem Voalan there is a deep passage. About 4 cables southward of Goh Keo Jai is Goh Keo Noi, of about the same elevation, and wooded. Besides these two islets there are several others lying off this coast, all high and wooded, with depths of from 5 to 10 fathoms ($9^{m}1$ to $18^{m}3$) around them, except off the northern side of Goh Loan (*see* below).

A light (*Lat. 7° 44′ N., Long. 98° 18′ E.*) is exhibited, at an elevation of 167 feet ($50^{m}9$), from a white tower on the summit of Goh Keo Noi.

Goh Hee, 605 feet ($184^{m}4$) high, with a rock close off its south-western extremity, lies 3½ miles eastward of Goh Keo Noi. Goh Eo, 379 feet ($115^{m}5$) high, lies three-quarters of a mile north-north-eastward of Goh Hee.

Ao Chalong, entered between a point 2¼ miles north-eastward of Lem Voalan and Lem Panwar, about 5 miles east-north-eastward, is fronted by Goh Loan, 871 feet ($265^{m}5$) high, with a passage on either side of it for small craft, that on the western side having a least depth of 3¾ fathoms ($6^{m}9$), and that on the eastern side, 1½ fathoms ($2^{m}7$). Goh Tanarn lies 4½ cables northward of Goh Loan.

Two rivulets flow into the head of the bay and lead to large villages.

The best anchorage during the South-west monsoon for vessels with local knowledge, other than light craft, is outside Ao Chalang, in a depth of about 4 fathoms ($7^{m}3$), about 3 cables northward of Goh Aú, situated about 1½ miles east-north-eastward of Goh Keo Jai.

Tidal streams.—In the channels between the islands off the southern side of Goh Puket the tidal streams set eastward and westward at a rate of from one to 3 knots.

Chart 842, with plan of Puket harbour.

Puket harbour and approaches.—Dangers.—Light.—Puket harbour is entered between Goh Tapou Noi, about 2 miles north-north-eastward of Lem Panwar, and Lem Pabpar, about 2¼ miles farther in the same direction.

Charts 830, 70, 748b.

Chart 842, with plan of Puket harbour.

Goh Kai, about 12 miles east-south-eastward of Lem Panwar, is 218 feet (66m4) high, wooded and steep-to. About 3¼ miles northward of Goh Kai is Hin Musang, which dries 10 feet (3m0), and is steep-to.

Goh Mai Torn, 293 feet (89m3) high, and wooded, lies about 4½ miles south-eastward of Lem Panwar. A rock, with a depth of less than 6 feet (1m8), and steep-to, lies about 3 cables south-eastward of the southern extremity of the island. There is a sandy bight on the north-eastern side of the island, which affords some shelter for vessels with local knowledge during the South-west monsoon, in depths of 6 and 7 fathoms (11m0 and 12m8). The northern extremity of the island is low and sandy, and close northward of it is a rock awash.

Goh Dorkmai, 221 feet (67m4) high, with almost vertical sides, lies 7 miles eastward of Lem Panwar, and is steep-to.

There is a safe channel for vessels approaching from south-eastward bound for Puket harbour, leading westward of Goh Kai and between Goh Mai Torn and Goh Dorkmai.

Chart 842, plan of Puket harbour.

Lem Panwar is steep-to on its eastern side, but a sand spit, on which there is a reef which dries and some sunken rocks, extends about 1¾ cables south-westward.

Goh Tapou Yai (*Lat. 7° 50′ N., Long. 98° 25′ E.*), about 1½ miles northward of Lem Panwar, is 363 feet (110m6) high. The island lies near the middle of a bank, with depths of from 4 to 15 feet (1m2 to 4m6), and is fringed by a reef, which extends 1½ cables south-eastward from the southern extremity, and on the outer edge of which there is a rock above water. A rock, with a depth of less than 6 feet (1m8), lies about 4½ cables eastward of the same point.

Goh Tapou Noi lies on a bank with depths of less than 3 fathoms (5m5), about 2 cables north-eastward of Goh Tapou Yai.

A light is exhibited, at an elevation of 180 feet (54m9), from a white masonry tower, 37 feet (11m3) in height, on Goh Tapou Noi.

Lem Pabpar is the south-eastern extremity of an island separated from the eastern side of Goh Puket by Klong Tar Cheen, a narrow creek, which, at low water, is impassable even by boats.

A bank, with depths of less than one fathom (1m8), and on the north-eastern side of which there is a patch which dries, lies in the middle of the harbour, and about a quarter of a mile outside it, about midway between Goh Tapou Noi and Lem Pabpar there is a 2-foot (0m6) patch.

Anchorages.—Directions.—There are two anchorages in Puket harbour, the southern, in a depth of about 5 fathoms (9m1), about half a mile north-westward of the northern extremity of Goh Tapou Noi, and the northern, in depths of from 8 to 14 feet (2m4 to 4m3), about 1½ miles north-north-westward of the same point.

The bottom at both these anchorages is mud. The harbour is open to easterly and south-easterly winds, during the prevalence of which there is a little surf.

A vessel approaching from southward should, after passing the sunken rock about 4½ cables eastward of the southern extremity of Goh Tapou Yai, steer for Tongkah hill (chart 842), 930 feet (283m5) high, situated 3¼ miles north-westward of Lem Pabpar, bearing 340°, which leads midway between Goh Tapou Yai and Goh Tapou Noi, in a least depth of 23 feet (7m0), and thence to the southern anchorage.

Puket.—Puket stands about three-quarters of a mile from the

Chart 842, plan of Puket harbour.

entrance of a creek at the north-western end of Puket harbour. It is the residence of the Rajah, and the only port frequented by steam vessels. At low water the creek is nearly dry in places, the channel is marked by stakes, but no craft can ascend to the town, even at high water.

There is a landing stage near the Custom house at the entrance to the creek. There are two cranes here with lifting capacities of 10 and 12 tons.

The principal buildings are those of Government house, the Siamese Royal Commissioner, the Commandant's house, barracks and several tin-smelting factories. Tin is the principal export.

The population, in 1945, was about 40,000.

There is regular steamer communication with Penang.

Chart 842.

Eastern side of Goh Puket.—Coast.—Tharúa harbour is entered between Goh Maprau, 628 feet ($191^{m}4$) high, about one mile northward of the northern extremity of the island separated from Goh Puket by Klong Tar Cheen, and Lem Yam, about 2½ miles farther northward. The town of Tharúa stands 1½ miles up a rivulet of the same name. About three-quarters of a mile north-eastward of Goh Maprau is Alang Yai, with a depth of 5¼ fathoms ($9^{m}6$) in the fairway between them. Close northward of Alang Yai is Alang Noi, with foul ground between them.

Anchorage may be obtained by vessels with local knowledge, in a depth of 3 fathoms ($5^{m}5$), mud, with the northern extremity of Alang Yai bearing 110° and Goh Maprau, 185°.

A vessel approaching Tharúa harbour from southward should steer to pass half a mile eastward and thence northward of Alang Noi, where there are depths of 8 fathoms ($14^{m}6$), thence shoaling gradually westward to the anchorage.

About 3 miles north-eastward of Lem Yam (*Lat. 7° 59′ N., Long. 98° 26′ E.*) is Goh Naka Noi, 208 feet ($63^{m}4$) high, with several dangers and a rock, 15 feet ($4^{m}6$) high, between them. About half a mile north-eastward of this island is Goh Naka Yai, 280 feet ($85^{m}3$) high; between the southern extremity of the latter and Goh Puket there are several rocks, one of which is awash, and between the northern extremity of the same island and Goh Puket there is an island, 205 feet ($62^{m}5$) high, 2 miles northward of which there is a rock, 103 feet ($31^{m}4$) high.

Tidal streams.—Between the eastern side of Goh Puket and Goh Yao Yai (*see* below) the tidal streams set northward and southward at a rate of from 2 to 3 knots.

Islands and dangers eastward of Goh Puket.—Goh Yao Yai, the southern extremity of which lies about 9 miles eastward of Lem Pabpar, is traversed by a range of mountains, from about 750 to 1,225 feet ($228^{m}6$ to $373^{m}4$) high, extending the entire length of the island.

On the western side of the island is Ao Labu (Lubo), with depths of from 11 to 18 feet ($3^{m}4$ to $5^{m}5$). An islet, and some rocks, above and below water, lie within three-quarters of a mile north-north-westward of the southern entrance point of the bay; the northern part of the bay is clear of dangers. There are two villages on the shores of the bay.

At the southern end of Goh Yao Yai is Ao Lubaling, entered between Goh Musang, on the west, and Lem Hualan, on the east. Goh Musang

Chart 842.

is connected to the main island by foul ground, which dries about 6 feet (1^{m}8), and about 2 cables south-eastward of the island are some rocks about 30 feet (9^{m}1) high. Lem Hualan is high, bold and steep-to. Klong Lubaloi discharges into the head of Ao Lubaling, and about one mile up this river is a village of the same name.

Between Lem Hualan and a point about 9 miles northward, the east coast of Goh Yao Yai is high, bold and steep-to, thence to the north-eastern extremity of the island it is low and sandy. About 3 miles north-eastward of Lem Hualan is Hin Musang Nua, 44 feet (13^{m}4) high, with a deep passage between. Foul ground, on which there are some rocks above water, extends about 1¼ miles eastward from the point 9 miles northward of Lem Hualan. The northern coast of Goh Yao Yai is mostly low and sandy, but Lem Nia, the north-western extremity, is a high, steep-to bluff.

Goh Khai Nok, a sandy islet, 90 feet (27^{m}4) high, with a wooded bluff on its southern side, lies 4¾ miles east-north-eastward of Lem Pabpar. A rock, above water, lies about 2 cables east-south-eastward of the islet, and a rocky patch, on which there is a rock above water, lies about 4 cables north-north-westward of the islet. Goh Khai Noi, lower than Goh Khai Nok, lies 2 miles north-eastward of it; it is fringed by rocks, and a 14-foot (4^{m}3) patch lies about three-quarters of a mile south-westward of it.

Goh Leepee, 566 feet (172^{m}5) high, and conical, lies about 3½ miles northward of Goh Khai Nok. Goh Soob, 113 feet (34^{m}4) high, lies about 3¾ miles northward of Goh Leepee; it consists of two vertical, steep-to rocks.

Goh Yao Noi, a densely wooded island, is separated from the northern end of Goh Yao Yai by a channel with a least depth of about 4 feet (1^{m}2), and a least navigable width of about 2½ cables at its eastern end. There is a rock, which dries 3 feet (0^{m}9), in the middle of the channel, about 4 cables north-north-westward of the north-eastern extremity of Goh Yao Yai.

An islet, with a rock awash close northward of it, lies about 4 cables eastward of the southern extremity of Goh Yao Noi. About 4 miles south-eastward of the same point is Goh Ngang, and 3¼ miles eastward is an island, 514 feet (156^{m}7) high; within 3 miles farther northward there are several islets, most of which are high and steep-to, and between them and the eastern side of Goh Yao Noi there is a channel about 2 miles wide, clear of dangers.

The western extremity of Goh Yao Noi is fringed by a reef, on the outer edge of which is Goh Yung, 104 feet (31^{m}7) high, about 3½ cables north-westward of which is Goh Boi Yai, 641 feet (195^{m}4) high, and fringed by a reef on its north-eastern side to a distance of a quarter of a mile, on which there are some rocks above water. About three-quarters of a mile northward of Goh Boi Yai is Goh Boi Noi, 474 feet (144^{m}5) high, with two islets between them.

PANGA BAY.—Islands and dangers.—Panga bay is the extensive bight entered between Lem Som (*Lat. 8° 08′ N., Long. 98° 26′ E.*), the northern entrance point of the eastern end of Chong Parkprah (page 98), and the mainland, about 18 miles eastward.

On the western side of the bay are numerous islands extending 3 miles offshore, the largest of which are Goh Panak, 1,255 feet (382^{m}5)

Charts 830, 70, 748b.

high, the southern extremity of which lies about 4 miles north-eastward of Lem Som, and Goh Rayaring 1,465 feet ($446^{m}5$) high, 4½ miles farther northward. The area between these islands and the western shore is encumbered with rocks and sand banks, some of which dry.

About 3 cables north-eastward of the northern extremity of Goh Yao Noi is Goh Kudu Yai, 428 feet ($130^{m}4$) high, close westward of which is Goh Kudu Noi, both steep islands, which can be passed on either side. The channel between Goh Yao Noi and Goh Kudu Yai is deep, but that northward of the latter is wider and clear of dangers, and is generally used. About 1¾ miles eastward of the northern extremity of Goh Yao Noi are two high vertical rocks, close together, and 1¼ miles farther eastward is a rock, above water.

One mile westward of Goh Kudu Noi is Goh Roi, 540 feet ($164^{m}6$) high, 1¼ miles north-westward of which is Goh Batang, 494 feet ($150^{m}6$) high, with depths of from 2¼ to 5¼ fathoms ($4^{m}1$ to $9^{m}6$) between them. About 2 miles west-north-westward of the northern extremity of Goh Batang is Hin Mod-daang, which nearly covers at high water.

About 2 miles north-north-eastward of Goh Kudu Yai is Goh Khlui, with Goh Dua, 172 feet ($52^{m}4$) high, 4 cables westward of its southern extremity. Goh Khlui is 700 feet ($213^{m}4$) high near its northern end, and is steep-to on its western side. Goh Chong Lad, 996 feet ($303^{m}6$) high near its southern end, lies about 2 cables northward of Goh Khlui. About 1½ cables north-north-westward of Goh Chong Lad is Goh Ngam, which lies close off the southern end of a sandbank, which dries, which extends about 5 miles northward to the mouth of the Klong Pak-lao (Parklao). Hin Bai, about one foot ($0^{m}3$) high, lies 6 cables northward of Goh Ngam and 2 cables westward of the sandbank.

Goh Mark, 156 feet ($47^{m}5$) high, and wooded, lies about 1¼ miles westward of the northern extremity of Goh Chong Lad, with a depth of about 5 fathoms ($9^{m}1$) in mid-channel between; the island is fringed by a sandbank which dries.

Anchorage.—Anchorage may be obtained by vessels with local knowledge, in a depth of about 5 fathoms ($9^{m}1$), about 5½ cables north-eastward of the eastern extremity of Goh Mark.

Tidal streams.—In the channel eastward of Goh Yao Noi the tidal streams set northward and southward at a rate of from 2 to 3 knots.

Head of Panga bay.—Light.—Several rivers flow into the head of Panga bay, Klong Krasom and Klong Panga at the north-western end, and Klong Bor Saen (San) and Klong Pak-lao at the north-eastern end.

The entrance to Klong Krasom lies about one mile north-westward of Goh Rayaring (*Lat. 8° 17′ N., Long. 98° 30′ E.*), and is about half a mile wide. The channel lies between several islands and sandbanks which encumber the entrance. The town of Krasom is situated about 4½ miles from the entrance. A large quantity of tin is exported.

Klong Panga flows out about 1½ miles eastward of the entrance to Klong Krasom. From the eastern entrance point a shoal, which dries, extends about 2¼ miles south-eastward, and about three-quarters of a mile southward of the same point is Goh Nomsao Yai, 189 feet ($57^{m}6$) high, lying on the eastern side of the channel, one cable south-westward of which, on Goh Nomsao Noi, there is a light-tower. About 3½ cables south-westward of the island, on the western side of the

Chart 842.

channel, is a shoal which dries, about 8 cables long, lying in a north-westerly and south-easterly direction.

About midway between the entrance points is another shoal, which dries, and about one mile north-westward of the eastern entrance point is Goh Panyi, 455 feet ($138^{m}7$) high, from which a shoal extends about 2½ cables southward, parallel to the eastern shore of the river. The channel lies between the eastern entrance point and the shoal westward of it, and eastward of Goh Panyi.

About 8 miles above the entrance is the town of Panga, which had, in 1945, a population of about 3,000. The shoals in Klong Panga are usually marked by a tall reedy grass growing on them, and are, therefore, easily avoided.

Panga is bordered by precipitous cliffs, about 1,000 feet ($304^{m}8$) high, the valley in which it is situated is exceedingly fertile, and there is a considerable rainfall between May and December. The inhabitants are mostly Siamese, with a few Malays and Chinese.

A light is exhibited, at an elevation of 82 feet ($25^{m}0$), from a white concrete tower, 6 feet ($1^{m}8$) in height, on Goh Nomsao Noi.

Between the mouth of Klong Panga and the western entrance point of Klong Bor-Saen, about 6 miles east-north-eastward, the coast is fringed by a sandbank which dries, extending from about three-quarters of a mile to 2¼ miles offshore.

Klong Bor-Saen and Klong Pak-lao flow from northward and eastward, respectively, into the same estuary. Two islets, named Goh Song Pi-nong, 497 and 562 feet ($151^{m}5$ and $171^{m}3$) high, respectively, lie in the fairway of the approach to the entrances of these rivers, about 1½ miles south-south-westward of the point separating them. The channel, which lies between these two islets, has a depth of about 4½ fathoms ($8^{m}2$), and is about 1½ cables wide.

In the entrance to Klong Pak-lao there is a bar with a depth of 2 fathoms ($3^{m}7$), but within, the depths increase to about 3½ fathoms ($6^{m}4$). The town of Pak-lao is situated about 6 miles up the river.

Directions.—A vessel bound for Panga from southward, after passing 1½ miles eastward of Lem Pabpar (page 99), should keep in about mid-channel between Alang Yai and Goh Leepee, thence steer to pass between Goh Naka Noi and Goh Soob, thence between Goh Panak and Goh Boi Noi, thence steer 000°, which leads to the entrance to Klong Panga. Only vessels with local knowledge should approach the entrance to Klong Panga and Klong Krasom.

A vessel bound for Klong Pak-lao from southward should pass eastward of Goh Yao Yai and Goh Yao Noi, thence between Goh Khlui on the east and Goh Sum and Goh Pai, distant 1½ miles, on the west, thence between Goh Ngam and Goh Mark to the anchorage.

COAST.—Lem Sak (*Lat. 8° 16′ N., Long. 98° 38′ E.*), the south-eastern extremity of the peninsula, about 5 miles northward of the northern point of Goh Yao Noi, is high and bold land, but the point itself is low, sandy, and covered with trees. Reefs and sandbanks which partly dry, extend about a quarter of a mile from the point; between this point and Lem Deng, a bold point about 5 miles south-eastward, is a bay with depths of less than 4 fathoms ($7^{m}3$).

Between Lem Deng and a point, about 5 miles southward, is a bay in which are several high rocky islands, between which and the coast

Charts 830, 70, 748b.

Chart 842.

the depths are from one to 2 fathoms ($1^{m}8$ to $3^{m}7$) ; thence to Lem Harng Nark, about 7 miles south-south-eastward, the coast is apparently clear of dangers.

Lem Harng Nark is a low point covered with trees, with a spit extending about half a cable from it. Goh Daeng and Goh Samed lie about one and 2½ miles, respectively, south-south-westward of Lem Harng Nark. A rock, which dries about 11 feet ($3^{m}4$), lies about 2½ cables northward of Goh Daeng. There is a deep passage between this rock and the mainland.

Ao Krabi.—Light.—Ao Krabi is entered between Lem Harng Nark and the north-western extremity of Goh Pu, about 14 miles south-eastward. About 3½ miles south-south-eastward of Lem Harng Nark is the Badah group of islands, the largest of which are Goh Darmhork and Goh Darmkhwarn, 712 and 637 feet ($217^{m}0$ and $194^{m}2$), high, respectively.

Ao Narng, entered between Lem Harng Nark and Lem Narng, 4½ miles east-south-eastward, is backed by moderately high hills. There are several islets and rocks above water near the head of the bay. The eastern side of the bay is formed by a succession of vertical limestone cliffs, about 300 feet ($91^{m}4$) high. One of these, named Banana rock, near the eastern entrance point, resembles a banana, and is unmistakable ; it is visible from a considerable distance, together with the high extremity of the point southward of it.

Redpole bay, eastward of Banana rock, has a low wooded shore. The head of the bay dries for a distance of about one cable offshore, with depths of 2 fathoms ($3^{m}7$) a short distance beyond.

In 1891, H.M.S. *Redpole* anchored in a bight about half a mile wide, on the western side of this bay, from 3 to 4 cables northward of Lem Narng. Here, in a position about midway between the entrance points and about half a mile offshore, is a depth of 3½ fathoms ($6^{m}4$), with shelter from all except south-easterly and easterly winds.

Ao Nammau is entered between Lem Narng and a point about 2½ miles east-north-eastward. Between the latter and a point about 4 miles south-eastward there is a bight, the eastern shore of which dries out to a distance of about 1½ miles, and a patch, which dries, lies 1¾ miles south-eastward of the north-western entrance point. A channel, which had a least depth of 3 feet ($0^{m}9$) in 1937, leads to the common estuary of Klong Chi-rad and Klong Krabi, at the head of the bight.

A light is exhibited, at an elevation of 66 feet ($20^{m}1$), from a white framework structure, 66 feet ($20^{m}1$) in height, on Goh Nok, situated about three-quarters of a mile south-westward of the entrance to Klong Krabi (*Lat. 8° 03′ N., Long. 98° 55′ E.*).

Krabi is a town with a population, in 1945, of about 2,000, standing on the west bank of Klong Krabi, about 1½ miles within the entrance. There is a jetty here. Vessels with a draught of 13 feet ($4^{m}0$) can reach Krabi.

Coast.—Klong Pakasi discharges about 3 miles south-eastward of the entrance to Klong Krabi. There are depths of from 3 to 5 fathoms ($5^{m}5$ to $9^{m}1$) in its mouth but there are sandbanks in its approach, with depths of less than one fathom ($1^{m}8$) between them. About 4½ miles farther southward is Goh Sibawyar, 502 feet ($153^{m}0$) high, close south-westward of which is Goh Pu, 1,299 feet ($395^{m}9$) high.

Outlying islands and dangers.—A group of islands lie south-

Charts 830, 70, 748b.

westward of Goh Pu. Goh Maipai (*Lat. 7° 49′ N., Long. 98° 48′ E.*), the northernmost island, lies 8½ miles westward of the western extremity of Goh Pu, and one mile farther westward is Goh Yung, 510 feet (155m4) high. Hin Kong Nork, with a depth of less than 6 feet (1m8), lies 3¼ miles westward of the western extremity of Goh Pu.

Goh Pipidorn, the largest of the group, lies with its northern extremity 2¾ miles south-westward of Goh Maipai, and is 1,094 feet (333m5) high in its south-western part. At the southern end of the island there is a bight, with a depth of 11 fathoms (20m1) in the middle, but there is a sunken rock about a quarter of a mile eastward of the western entrance point.

Goh Pipilay lies nearly 1¼ miles southward of Goh Pipidorn, with a deep channel between them. Two high islets lie about one mile southward of Goh Pipilay. Hin Klai, with a depth of less than 6 feet (1m8), lies about 2¾ miles eastward of the northern extremity of Goh Pipilay. Hin Bidah, a rock awash, and Goh Mar lie, respectively, 3¾ and 6¾ miles south-eastward of the southern extremity of Goh Pipilay.

Goh Raja Yai, 1,064 feet (324m3) high in the south-western part, and low on the north-eastern side, lies about 9 miles south-south-eastward of the southern extremity of Goh Puket. *See* view facing this page, and on chart 842.

Gulnare cove, situated on the north-western side of Goh Raja Yai, has a depth of 9 fathoms (16m5), sand, in the middle. There is a small cove on the northern side of the island.

Goh Raja Noi, about 5 miles south-south-westward of Goh Raja Yai, are two densely wooded, steep-to islands, nearly connected to each other by a reef. The northern island, 579 feet (176m5) high, has a rock lying 3½ cables off its northern extremity; the southern island is of nearly uniform height, and has a reef extending about one cable from its southern extremity. *See* view facing this page, and on chart 842.

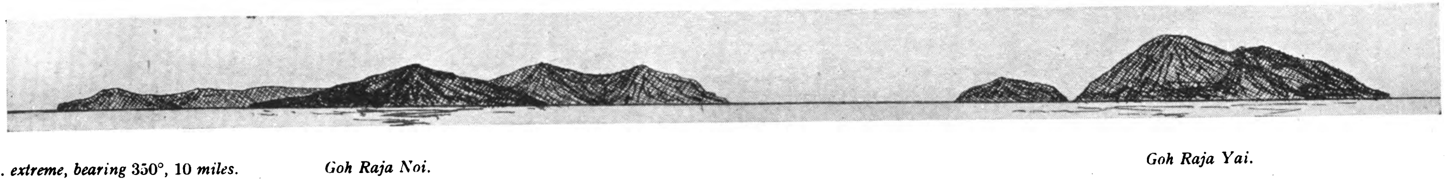
There are heavy overfalls on the southern side of the passage between Goh Raja Yai and Goh Raja Noi.

Coast.—Goh Klarng, close off the mainland, is separated from the eastern side of Goh Pu by a channel, with a least depth of 3¾ fathoms (6m9) in the fairway, but in its southern approach there is a least depth of about 2 fathoms (3m7). This channel leads northward along the eastern and northern sides of Goh Sibawyar. Hin Loah-lah, a rock awash, lies in the south-western approach to this channel, about 1¾ miles south-south-westward of the southern extremity of Goh Pu, and another rock awash lies 3 miles southward of the same point.

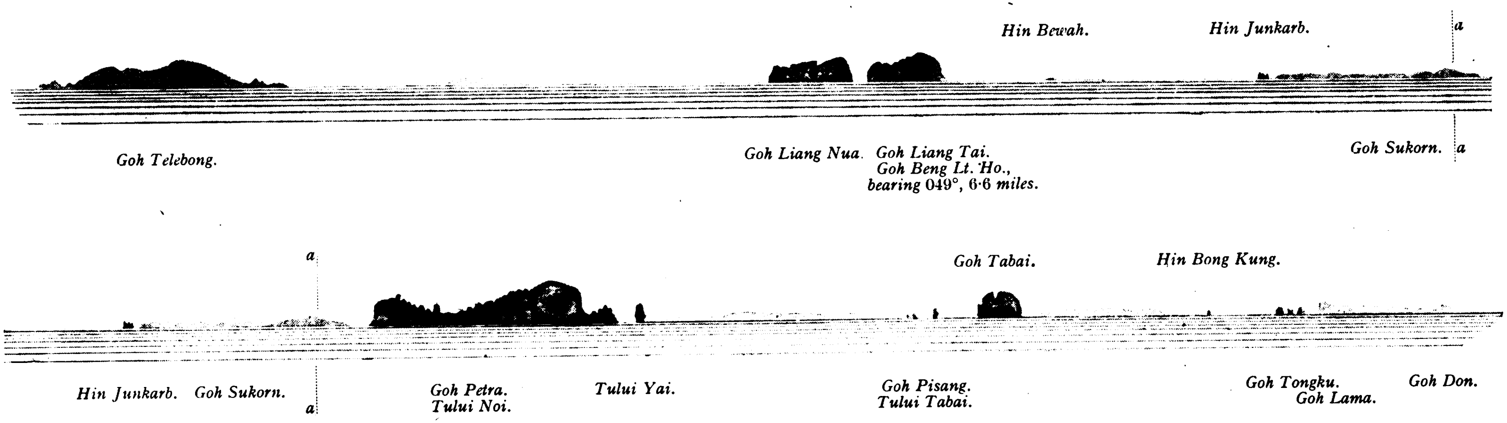
Goh Lantar Noi and Goh Lantar Yai, close southward of it, are separated from the southern side of Goh Klarng by a narrow shallow channel; from seaward they appear as one island. The southern part of Goh Lantar Yai consists of a narrow ridge of steep mountains attaining an elevation of 1,650 feet (502m9); the northern part is mostly flat and low-lying, but has several isolated hills; all the hills are thickly wooded. The population of the island was reported, in 1934, to be about 2,000, chiefly Siamese, Chinese and Malays living in scattered villages, the largest of which lies on the south-eastern side.

Along the eastern sides of these islands are several high wooded islets, between which and the sand banks extending from the mainland there

To face page 106.


W. extreme, bearing 350°, 10 miles.
Goh Raja Noi.
Goh Raja Yai.

Goh Raja Noi and Goh Raja Yai.
(*Original dated prior to* 1924.)


Hin Bewah.
Hin Junkarb.
a
Goh Telebong.
Goh Liang Nua.
Goh Liang Tai.
Goh Beng Lt. Ho.,
bearing 049°, 6·6 miles.
Goh Sukorn.
a
a
Goh Tabai.
Hin Bong Kung.
Hin Junkarb.
Goh Sukorn.
a
Goh Petra.
Tului Noi.
Tului Yai.
Goh Pisang.
Tului Tabai.
Goh Tongku.
Goh Lama.
Goh Don.

View, in two parts, of south-western approach to Kantang.
(*Original dated* 1937.)

Chart 842.

is a narrow channel, with depths of from 3 to 5¼ fathoms ($5^{m}5$ to $9^{m}6$), extending as far northward as the parallel of the southern extremity of Goh Klarng (*Lat. 7° 41′ N., Long. 99° 06′ E.*). About half a mile south-eastward of Goh Karm, which is 640 feet ($195^{m}1$) high, situated about 1½ miles eastward of the southern extremity of Goh Lantar Noi, is a rock, 18 feet ($5^{m}5$) high, resembling two square sails standing out of the water.

Anchorages.—Vessels may obtain anchorage during the North-east monsoon, in depths of from 8 to 11 fathoms ($14^{m}6$ to $20^{m}1$), soft mud, south-eastward of the southern end of Goh Lantar Yai. Vessels of shallow draught can anchor during the South-west monsoon, in a depth of 3 fathoms ($5^{m}5$), soft mud, between the eastern side of Goh Lantar Yai and Goh Paw, an islet, 298 feet ($90^{m}8$) high, situated 4 miles north-north-eastward of the southern extremity of Goh Lantar Yai.

Anchorage may be obtained, in a depth of 4¼ fathoms ($7^{m}8$), about 2¼ miles east-north-eastward of the north-eastern extremity of Goh Lantar Noi.

Tidal streams.—In the channel eastward of Goh Lantar Noi the tidal streams set northward and southward, at a rate of from one to 1½ knots.

Islands and dangers.—About 6½ miles south-eastward of Goh Lantar Yai is Goh Ngai, the north-westernmost island of a group which extends 14 miles farther south-eastward. It is 727 feet ($221^{m}6$) high, and within one mile eastward of it are several islets. Goh Muk, 1,183 feet ($360^{m}6$) high on its western side, lies on the edge of the coastal bank, 4 miles east-south-eastward of Goh Ngai; on its south-eastern side there is a low sandy coast. There is a very narrow channel, with a depth of 7 feet ($2^{m}1$), between the island and the mainland. About 1¾ miles westward of the north-western extremity of the island is Goh Waen, 763 feet ($232^{m}6$) high, and 1½ miles southward of the southern extremity is a rock, with a depth of less than 6 feet ($1^{m}8$).

Goh Kradarn, 487 feet ($148^{m}4$) high, lies 3 miles south-westward of Goh Muk; it is steep-to on its western side, but its eastern side is foul.

Goh Talibong, about 6½ miles south-eastward of Goh Muk, has a high ridge on its western side, terminating at its southern end at an elevation of 1,048 feet ($319^{m}4$); the remainder of the island is low. The island is separated from the mainland by a channel 1½ miles wide, in the western entrance of which there is a least depth of 12 feet ($3^{m}7$); the eastern part of the channel is encumbered with sand banks, and in the southern approach there are numerous rocks, some of which dry. Goh Nok, a rock above water, lies 1¾ miles east-north-eastward of the eastern extremity of Goh Talibong.

Hin Nork, a rock awash, lies about 4½ miles west-north-westward of the western extremity of Goh Talibong. Hin Sampau-chom are two rocks awash lying about 3 miles west-south-westward of the southern extremity of the same island. Goh Kwarng, a rock above water, lies on the outer edge of the reef which dries extending about half a mile westward from the western extremity of Goh Talibong.

Anchorage.—Good anchorage may be obtained by vessels with local knowledge, in a depth of 6 fathoms ($11^{m}0$), during the North-east monsoon, with the southern extremity of Goh Talibong bearing 037°, distant 1½ miles. Vessels should not seek shelter eastward of the point during the South-west monsoon.

Charts 830, 70, 748b.

Chart 842.

Outlying islets.—Goh Har Yai (*Lat. 7° 25′ N., Long. 98° 54′ E.*) is a group of five islets lying about 12 miles west-south-westward of the southern extremity of Goh Lantar Yai; they are of a whitish colour, bold and steep-to, and are difficult to distinguish at night on account of their colour.

Goh Rok Nai and Goh Rok Nork lie about 17 miles westward of Goh Talibong; both islands are wooded and steep-to, and Goh Rok Nork is 776 feet (236^m5) high. On the eastern side of Goh Rok Nork is a waterfall, the water falling almost from the summit of the island into the sea; the southern extremity of this island is high and bold.

Hin Daeng, 8 feet (2^m4) high, lie 14 miles west-south-westward of Goh Rok Nork; they consist of two rocks, which are difficult to distinguish during the South-west monsoon; there is often a strong tidal stream in their vicinity. A bank, with a depth of 14 fathoms (25^m6), lies nearly one mile southward of Hin Daeng.

Current.—Southward of Goh Puket (page 98) during the North-east monsoon, the current sets north-westward, and during the South-west monsoon south-eastward, but after strong westerly or west-north-westerly winds, southward of Goh Raja Noi, it sets eastward.

A vessel proceeding southward from a position off Goh Rok Nork may steer to pass between the Butang group, 38 miles southward, and Pulau Tenga, eastward of it, and thence outside Pulau Singa besar (page 116), about 26 miles south-eastward.

In October the general set in the eastern part of the Bay of Bengal northward of Malacca strait becomes north-westerly, but south-easterly sets probably still predominate to some extent southward of Goh Puket.

Coast.—Light.—Eastward of Goh Talibong is the mouth of Klong Trang; this river discharges into a large bay which is encumbered with rocks and sandbanks, of which the greater part dry. The mouth of the river may be approached by vessels of shallow draught with local knowledge, either northward or eastward of Goh Talibong; the northern channel can only be used at high water; the eastern channel has a least depth of 1¼ fathoms (2^m3). The tidal streams in both channels have a rate of from one to 2 knots.

There is a fishing village on the western side of the river mouth where river pilots may be obtained. Klong Trang has a general north and south direction, and extends about 30 miles inland; it is narrow and tortuous, with depths of from 3 feet to 4 fathoms (0^m9 to 7^m3) in places. The channel is marked by beacons or stakes. It is reported to be navigable by vessels with a draught up to 10 feet (3^m0) as far as Kantang, about 9 miles upstream.

There are depths of from 3 to 12 feet (0^m9 to 3^m7) off Kantang. There is a pier with a **T**-head at Kantang, with a depth of 4 feet (1^m2) alongside, available for a vessel 120 feet (36^m6) long. There is a crane with a lifting capacity of 5 tons on the pier. There is a wooden jetty a short distance above the pier.

Vessels with a draught of 6 feet (1^m8) can ascend as far as Trang, about 4 miles above Kantang. There is reported to be a wooden pier at Trang.

There is regular steamer communication between Kantang and Penang. Kantang is connected to the main railway system of the Malay peninsula, and is the mainland terminus of the Puket ferry service.

Charts 830, 70, 748b.

Chart 842.

Klong Palean discharges into the sea close eastward of Klong Trang, and, at its entrance, and for some distance up, is reported to have depths of from 3 to 5 fathoms (5^{m}5 to 9^{m}1), but the depths are considerably less in the approach, which is the same as for Klong Trang. A vessel of 12 feet (3^{m}7) draught, it is reported, can ascend about 1½ miles at three-quarters flood, at which distance there is a fishing village, and one of 6 feet (1^{m}8) draught to about 15 miles at high water. The town of Palean is about 10 miles from the mouth.

About 12 miles south-south-eastward of the mouth of Klong Palean is Pak nam Lepung, a wide shallow estuary, encumbered with fishing stakes.

A light (*Lat. 7° 07′ N., Long. 99° 39′ E.*) is exhibited, at an elevation of 162 feet (49^{m}4), from a white iron framework structure, 59 feet (18^{m}0) in height, on Yong Star, the northern entrance point of Pak nam Lepung.

About 4 miles south-westward of the light-structure is the south-eastern extremity of Goh Sukorn, 525 feet (160^{m}0) high, and wooded. There are some villages on Goh Sukorn, which is the only inhabited island on this part of the coast. Between Goh Sukorn and the coast is a wooded islet, 227 feet (69^{m}2) high.

A wooden pier, used by small steamers at high water, is situated about 2 miles east-north-eastward of Yong Star light structure; the approach channel to the pier is narrow and shallow; there is a village in the vicinity.

On the southern side of the entrance to Pak nam Lepung, and close offshore, is Goh Tahbun, a remarkable, noticeable limestone islet, with sheer sides and a flat top, 770 feet (234^{m}7) high; three other similar but smaller islets are in the vicinity.

About 5 miles southward of Goh Tahbun is the entrance to Klong Rawai, a comparatively narrow river flowing out over a wide sandy bar; about 3 miles further southward is Klong Tanjong Lanai, the northern entrance point of which, Lem Tanjong Lanai, rises to a wooded summit, 310 feet (94^{m}5) high. About 6 miles further southward is Goh Tanjong Duree.

Off-lying islets and dangers.—Light.—Goh Liang Nua and Goh Liang Tai, two bare and precipitous islands, 705 and 786 feet (214^{m}9 and 239^{m}6) high, respectively, situated about 8 miles westward of Goh Sukorn, form the northern extremity of a chain of islands and rocks which extends southward to within about 7½ miles north-westward of Pulau Terutau (page 112); the two islands lie on the southern side of the main approach to Klong Trang and Klong Palean.

Goh Beng is a small sparsely wooded islet, 89 feet (27^{m}1) high, lying about 2½ miles south-westward of Goh Liang Tai. *See* view facing page 106.

A light is exhibited, at an elevation of 130 feet (39^{m}6), from a white masonry tower, 38 feet (11^{m}6) in height, on Goh Beng.

A rock, 12 feet (3^{m}7) high, lies 6 cables south-south-eastward of Goh Beng; a reef, which dries, extends 1½ cables northward from this rock, and the same distance south-westward from it.

Hin Jungkarb, a steep-to islet with two sharp summits, 135 feet (41^{m}1) high, lies 3½ miles eastward of Goh Beng. Goh Pe-Tra, the most remarkable island in this vicinity, lies 5 miles south-eastward of Goh Beng; it is bare, precipitous, and steep-to, except off a sandy

Charts 830, 70, 748b.

Chart 842.

beach on the eastern side. A chain of peaks, attaining an elevation of 889 feet (271^{m}0) at the northern end, and 1,249 feet (380^{m}7) at the southern end, extends along the middle of the island.

Two remarkable steep-to pinnacle rocks, Tului Noi and Tului Yai, 168 and 387 feet (51^{m}2 and 118^{m}0) high, lie off the western and south-western sides respectively, of Goh Pe-Tra. Hin Raya, 12 feet (3^{m}7) high, lies 1½ miles eastward of the northern extremity of Goh Pe-Tra, and is fringed by a rocky ledge which extends about three-quarters of a mile southward and eastward, and nearly half a mile westward. Between Goh Pe-Tra and Hin Raya (*Lat. 7° 03′ N., Long. 99° 30′ E.*) there are depths of less than 12 feet (3^{m}7), and a detached rock, with a depth of 2 feet (3^{m}7), lies nearly in the middle of the channel.

Goh Dang, a wooded islet, 146 feet (44^{m}5) high, lies about 3½ miles eastward of Goh Pe-Tra, with Goh Dang Noi, two rocks, 47 and 59 feet (14^{m}3 and 18^{m}0) high, respectively, about 6 cables east-north-eastward of it; two rocks, one awash and the other which dries 5 feet (1^{m}5), lie close north-westward of Goh Dang Noi and a group of rocks, one of which is 9 feet (2^{m}7) high, lies about a mile south-eastward. The passage between Goh Dang and Goh Sukorn is almost entirely blocked by shoals extending from the latter.

Goh Tabai, 737 feet (224^{m}6) high, lies about 2¾ miles southward of Goh Pe-Tra and is a bare precipitous island easily identified by a deep cleft near its summit; a steep-to pinnacle rock, 202 feet (61^{m}6) high, lies about 3½ cables northward of it. Hin La-Yiag, steep-to and 38 feet (11^{m}6) high, lies about 2½ miles eastward of Goh Tabai. Goh Pisang, about 3½ miles eastward of Hin La-Yiag, is a flat-topped wooded island, 203 feet (61^{m}9) high. The coastal bank extends with depths of less than 3 fathoms (5^{m}5) between Hin La-Yiag and Goh Pisang.

Hin Bongkung, 133 feet (40^{m}5) high, Goh Tongku, consisting of three islets, the highest having an elevation of 341 feet (103^{m}9), and Goh Lama, 620 feet (189^{m}0) high, are all bare precipitous steep-to islets situated on the line joining Goh Tabai and Goh Don, 10 miles south-eastward. A rock, with a depth of 6 feet (1^{m}8), lies about 4 cables north-eastward of Goh Lama.

Goh Buloan Lay lies about 8 miles westward of Goh Tanjong Duree; it is thickly wooded, with a flat summit, 615 feet (187^{m}4) high to the tops of the trees; it is steep and rocky except off the eastern end, from which a spit, with depths of less than 3 fathoms (5^{m}5), extends about 2¼ miles south-eastward; a rock, 7 feet (2^{m}1) high, lying on a rocky ledge, which dries, is situated about one mile north-north-westward of the eastern extremity of the island; another rock, 25 feet (7^{m}6) high, lies close off the south-western extremity.

About 1¾ miles southward of Goh Buloan Lay is Goh Rangnok, 364 feet (110^{m}9) high, thickly wooded and conical; about 1¼ miles westward of Goh Rangnok is Goh Ahyum, a similar islet, 239 feet (72^{m}8) high, with two rocks above water close westward of it, the western one being bare and white. Goh Don, 438 feet (133^{m}5) high, and Goh Buloan Maipai, 412 feet (125^{m}6) high, are situated between Goh Buloan Lay and Goh Tanjong Duree, and have well-defined wooded summits. Perse rock, with a depth of 6 feet (1^{m}8), lies about 1¼ miles eastward of Goh Buloan Maipai.

In 1945, less depths were reported in the area between Goh Buloan

Charts 830, 70, 748b.

Chart 842.
Lay, Goh Don and Goh Buloan Maipai (*Lat. 6° 50′ N., Long. 99° 36′ E.*).

Tidal streams.—Between the mainland and the off-lying islands the tidal streams set towards and away from the coast at a maximum rate of less than one knot. Off Goh Buloan Lay they are similar in character, but the west-going stream is the stronger, attaining a rate of over one knot. Off Goh Beng the tidal stream is rotary, changing direction regularly in an anti-clockwise direction, its rate, less than half a knot, remaining fairly constant.

Between Goh Buloan Lay and the islets immediately southward of it both streams are generally weak and irregular, but at springs the east-going stream is occasionally experienced from about 3 hours before until high water, and the west-going stream from about 2 to 5 hours after high water, attaining rates of about 1½ knots.

At a distance of 2 or 3 miles northward of Pulau Terutau, from 4 hours before to the time of high water, the stream sets between north-east and south-east, and from 2 to 5 hours after high water, between north-west and south-west; the maximum rate is 1½ knots.

Off the western coast of Pulau Terutau the streams are generally weak and irregular, the greatest observed rate being one knot.

Directions.—Goh Don to Klong Trang.—After passing Goh Don, a vessel using the inner route to Klong Trang should pass at least one mile eastward of Goh Lama and then steer to pass the same distance westward of Hin La-Yiag; thence it is possible to proceed to the estuary of the Klong Trang on a general northerly course, eastward of the islands, in a depth of not less than 2 fathoms ($3^{m}7$), but this passage is not recommended for vessels without local knowledge. Strangers should, therefore, pass westward of Goh Pe-Tra and between Goh Beng and Goh Liang Tai, entering the estuary by the main channel northward of Goh Liang Nua.

Coast.—The coast between the point abreast Goh Tanjong Duree (page 109) and Tanjong Gabus, 32 miles south-eastward, is fringed by a bank, with depths of less than 3 fathoms ($5^{m}5$), which extends as much as 9 miles offshore.

North-eastward of Goh Tanjong Duree, on the mainland, there are a number of steep hills of moderate elevation, and 4 miles eastward of the island are two hilly points; thence to Tanjong Pauh, about 18 miles south-eastward, the coast is low and mostly formed of mangroves, with many rivulets discharging into the sea. A considerable trade is carried on through the waterways which intersect this low country, and the land is cultivated. The entrances to the rivulets are much obstructed by shifting bars of sand, so that local knowledge is necessary.

Goh Tanjong Duree is densely wooded, and has two conspicuous hills, the southern and higher one having an elevation of 970 feet ($295^{m}7$). It is separated at its northern extremity from the mainland by a channel 1½ cables wide. Pulau Bulan, 388 feet ($118^{m}3$) high, lies close south-westward of Goh Tanjong Duree. A spit, with depths of from one to 3 fathoms ($1^{m}8$ to $5^{m}5$), on which there are some rocks above water, extends about three-quarters of a mile westward; the outer and largest of these is 145 feet ($44^{m}2$) high.

About 4¾ miles south-eastward of Goh Tanjong Duree, on the coastal bank, is Goh Tama, 450 feet ($137^{m}2$) high, and densely wooded, 1¼ miles westward of which is a rock, which dries 8 feet ($2^{m}4$), with an islet

Charts 830, 70, 748b.

Chart 842.

between them. About 4 miles farther south-eastward there is a group of wooded islets, lying on the coastal bank from one to 4 miles offshore, the highest of which has an elevation of 150 feet ($45^{m}7$).

Off-lying islets and dangers.—Light.—Pulau Lela lies about 5 miles southward of Goh Tanjong Duree and about 6 miles offshore.

A light (*Lat. 6° 44′ N., Long. 99° 42′ E.*) is exhibited, at an elevation of 216 feet ($65^{m}8$), from a white iron framework structure, 33 feet ($10^{m}1$) in height, on Pulau Lela.

Chart 793.

Kweh kechil, 95 feet ($29^{m}0$) high, lies about 12 miles south-south-eastward of Pulau Lela; a ridge of rocks, which dries, extends nearly half a mile northward from the island. Pulau Kweh, 190 feet ($57^{m}9$) high, lies about 1½ miles south-south-eastward of Kweh kechil; there is a small village on its south-eastern side, and, in 1935, there was a conspicuous tree on the islet. Between Pulau Kweh and Pulau Temlang (Temalang), about 9 miles eastward, there are several islets, the positions of which can be seen on the chart.

Charts 793, 842.

Communication.—Trade.—There is regular steamer service between Kuala Bahra, about 2½ miles northward of Goh Tanjong Duree, and Penang, and various small Siamese ports. Trade on this part of the coast is nearly all carried on by junks. The chief exports are rubber, copra, firewood, betelnut and fish.

Pulau Terutau.—Dangers.—Pulau Terutau lies with Tanjong Marah, its northern extremity, 5½ miles south-south-westward of Goh Tanjong Duree. The island is densely wooded and hilly, attaining an elevation of 2,365 feet ($720^{m}8$) near the middle. The only permanent village is on the eastern side in Wanderer bay.

There are two sandy beaches, separated by a steep rocky point, on the north-western side of the island between Tanjong Marah and West point, 8½ miles south-south-westward; thence to Pyramid point, the southern extremity of the island, the coast is mostly steep and rocky. The eastern side of the island is rocky and steep-to with several precipitous islets close offshore, but off Wanderer bay, the approach is shallower, with some extent of mud and stones, which dry.

Between Pulau Terutau and the mainland the greatest depths are found close to Pulau Terutau, but a bank, with depths of less than 3 fathoms ($5^{m}5$), extends nearly 10 miles from the mainland. A deep channel runs close to the islets, situated off the eastern side of Pulau Terutau, from abreast Tanjong Marah almost to Wanderer bay and, by following this channel and keeping about three-quarters of a mile offshore southward of Wanderer bay, a vessel may make the passage eastward of Pulau Terutau in depths of not less than 4½ fathoms ($8^{m}2$). Off the mainland there are extensive stretches of mud and sand which dry.

Wanderer bay.—Wanderer bay, entered between North and South islands, is exposed to the North-east monsoon, which blows strongly into the bay. A prominent rock, 175 feet ($53^{m}3$) high, with some white patches on its seaward side, lies 4¼ cables westward of the northern extremity of South island, and is a good mark when approaching the anchorage. A mudflat, which nearly dries and rather steep-to, extends about 3 cables from the southern end of the bay towards South island (*Lat. 6° 36′ N., Long. 99° 42′ E.*), leaving a channel between about 1½ cables wide, with a depth of 5 fathoms ($9^{m}1$).

Charts 830, 70, 748b.

Charts 793, 842.

Petok Wau, a Malay village, stands within the mouth of the creek abreast South island. There are many wild pigs on the island. Fish may be obtained with the seine in the vicinity of Bold point, about 6 cables northward of the prominent rock. Fishing stakes, the positions of which are subject to alteration, are situated in various parts of the bay.

Anchorage.—Directions.—Good anchorage may be obtained from one to 2 cables north-westward of the northern extremity of South island, in depths of from 3½ to 4 fathoms ($6^{m}4$ to $7^{m}3$).

A vessel should approach the anchorage with the **175-foot ($53^{m}3$)** rock bearing about 250°, and anchor when the northern extremity of South island bears 130°, or from that position steer for the western extremity of the island, and anchor in a depth of about 5 fathoms ($9^{m}1$).

Tidal streams.—Between Pulau Terutau and the mainland, the tidal stream sets north-westward from one hour after till 6 hours before high water at Penang, and south-eastward from 5 hours before until high water at Penang ; the rate does not normally exceed three-quarters of a knot at springs, except between Pulau Lela and Pulau Terutau where it may exceed one knot ; at neaps, the tidal stream is almost negligible.

Chart 793.

Islets and dangers.—Sail rock, a square rock, 130 feet ($39^{m}6$) high, resembling a sail, lies about 2¾ miles eastward of Pyramid point. A rock, 15 feet ($4^{m}6$) high, lies on a 3-fathom ($5^{m}5$) patch, about three-quarters of a mile north-westward of Sail rock. Belitung besar, about three-quarters of a mile south-eastward of the south-eastern extremity of Pulau Terutau, has a remarkable spire-shaped peak, 690 feet ($210^{m}3$) high ; between them is Marks island. Belitung kechil, 430 feet ($131^{m}1$) high, lies 1½ miles northward of Belitung besar, and about half a mile from the eastern side of Pulau Terutau. A rock, 165 feet ($50^{m}3$) high, lies 2¼ miles north-north-eastward of Belitung kechil.

A shingle patch, with a least depth of 15 feet ($4^{m}6$), lies 5 miles eastward of the southern entrance point of Wanderer bay. There are numerous fishing stakes between Pulau Terutau and the mainland. *See* page 20.

Osborne rock, 3 feet ($0^{m}9$) high, lies 4½ miles north-westward of West point.

Butang group.—Danger.—Butang group, lying between 15 and 27 miles westward of Pulau Terutau, is well wooded, and, in the offing, appears as one large island ; the islands are mostly steep-to. Dome mountain, 2,285 feet ($696^{m}5$) high, the summit of Pulau Adang, is noticeable ; approaching from westward it is visible over the flat summit of Pulau Rawi. The group is uninhabited, except for a small fishing village at the eastern end of Pulau Nipis.

Pulau Butang, 930 feet ($283^{m}5$) high, the westernmost island of the group, appears as a sharp peak from north-eastward and south-westward. There is a deep channel between Pulau Butang and Pulau Rawi, but it is not recommended on account of its narrow width. Observatory islet (*Lat. 6° 30′ N., Long. 99° 11′ E.*), 85 feet ($25^{m}9$) high, and consisting of almost bare rock, lies about 1¼ miles southward of the southern extremity of Pulau Butang, and between them are several wooded islets, with no navigable channel between them. *See* view facing page 115.

Charts 842, 830, 70, 748b.

Chart 793.

Pulau Rawi, the eastern peak of which is 1,610 feet ($490^{m}7$) high, is separated from Pulau Adang by Alert passage, which is 8 cables wide, and deep throughout.

Pulau Adang has a long sandy beach on the western side, fronted by a coral reef which extends one cable offshore.

Between Pulau Rawi and Pulau Adang, at the southern end of Alert passage, are several islets and rocks above water, the positions of which can be seen on the chart. Arch rock, one of these, can be easily identified, being in the form of an arch.

Close south-westward of the south-western extremity of Pulau Adang lies White rock, 14 feet ($4^{m}3$) high, a white granite boulder.

A rocky patch, with a depth of 32 feet ($9^{m}8$), lies about 1½ miles north-westward of White rock (*Lat. 6° 30′ N., Long. 99° 17′ E.*).

A rock, 100 feet ($30^{m}5$) high, lies 9 cables eastward of the northern extremity of the island.

Pulau Nipis is densely wooded and has two summits, the higher, at its south-eastern end, having an elevation of 375 feet ($114^{m}3$). The navigable channel between the island and Pulau Adang is very narrow, and is not recommended. Close eastward of Pulau Nipis lie three small islets and, about 1¼ miles farther eastward is a densely wooded islet, 210 feet ($64^{m}0$) high.

Pin islet, 7 feet ($2^{m}1$) high and steep-to, lies 3¼ miles eastward of Pulau Nipis.

Pulau Beisi, 375 feet ($114^{m}3$) high, lies 1½ miles eastward of the north-eastern extremity of Pulau Adang, with two rocks, one of which is 48 feet ($14^{m}6$) high, within three-quarters of a mile south-south-eastward of it.

Pulau Tenga, formed by two portions connected at low water by a reef, lies about midway between the Butang group and Pulau Terutau; the island is densely wooded, 650 feet ($198^{m}1$) high and steep-to, except on its eastern side, which is fringed by a narrow reef.

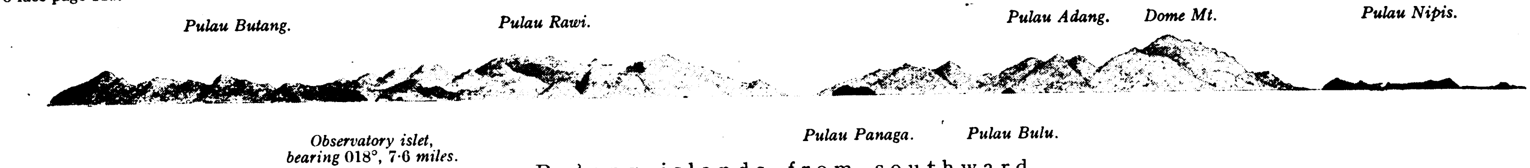
Pulau Suku, a small islet, 140 feet ($42^{m}7$) high, almost surrounded by a coral reef, is situated three-quarters of a mile eastward of Pulau Tenga, the channel between them being free from dangers, but marked by tide-rips.

The channel between Pulau Terutau and Pulau Tenga is free from dangers, except for Osborne rock, page 113.

Anchorages.—Directions.—During the North-east monsoon, the best anchorage is in a depth of about 15 fathoms ($27^{m}4$), sand, half a mile from the western side of Pulau Adang. A vessel approaching this anchorage from southward, should steer to pass half a mile westward of the western extremity of Pulau Nipis and the same distance off White rock, anchoring as convenient with Arch rock bearing about 235°. Approaching from northward, she should steer with the western extremity of Pulau Nipis, bearing 169°; this course will take her through Alert passage, clear of dangers, to the anchorage. During the South-west monsoon, the only protected anchorage appears to be north-eastward of Pulau Butang, in a depth of about 12 fathoms ($21^{m}9$), about 4 cables offshore, but the bottom here is irregular and there is not much swinging room.

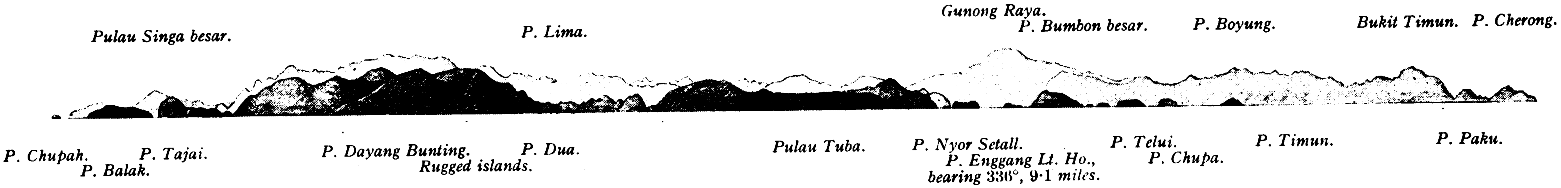
Tidal streams.—In the offing the tidal stream sets north-westward from about 2 hours after until 6 hours before high water at Penang, and south-eastward from 4 hours before high water until high water at

Charts 842, 830, 70, 748b.


Pulau Butang.
Pulau Rawi.
Pulau Adang.
Dome Mt.
Pulau Nipis.
Observatory islet, bearing 018°, 7·6 miles.
Pulau Panaga.
Pulau Bulu.

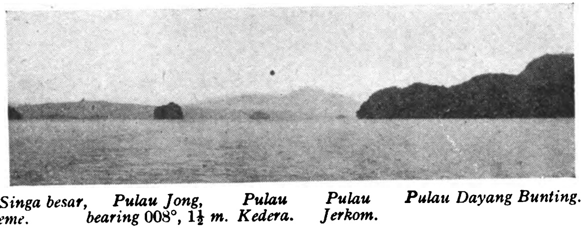
Butang islands from southward.

(*Original dated* 1935.)


Pulau Singa besar.
P. Lima.
Gunong Raya.
P. Bumbon besar.
P. Boyung.
Bukit Timun.
P. Cherong.
P. Chupah.
P. Balak.
P. Tajai.
P. Dayang Bunting.
Rugged islands.
P. Dua.
Pulau Tuba.
P. Nyor Setall.
P. Enggang Lt. Ho., bearing 336°, 9·1 miles.
P. Telui.
P. Chupa.
P. Timun.
P. Paku.

Langkawi islands from southward.

(*Original dated* 1934.)


Pulau Singa besar, E. extreme.
Pulau Jong, bearing 008°, 1½ m.
Pulau Kedera.
Pulau Jerkom.
Pulau Dayang Bunting.

Tyson strait from southward.

(*Original dated* 1923.)

Chart 793.

Penang. Close westward of Pulau Adang (*Lat. 6° 32′ N., Long. 99° 18′ E.*) the tidal streams are rather irregular but correspond approximately to those given above. The rates of the tidal streams do not appear to exceed one knot at springs, and at neaps they are very weak and irregular.

In the channel between Butang group and Pulau Terutau, the tidal streams are irregular, and much influenced by the wind.

PULAU LANGKAWI.—Pulau Langkawi is separated from Pulau Terutau by Langkawi (Lankawi) sound, 4 miles wide, with depths of over 10 fathoms ($18^{m}3$) in the fairway. The island is mountainous, formed and flanked by towering masses of limestone, and densely wooded. *See* view facing this page.

Gunong Raya, 2,888 feet ($880^{m}3$) high, the summit of the island, is situated near the middle; it may be identified from westward by its three peaks; but they are frequently obscured by clouds. Gunong Machinchang (Chinchang) rises abruptly from the western coast, and is a remarkably bold and precipitous range of mountains; its highest point is the middle summit of the range, 2,405 feet ($733^{m}0$) high, which appears cone-shaped from southward, and lies about 2½ miles south-eastward of Tanjong Chinchin (Ulor), the north-western extremity of the island. Pulau Hijau, 354 feet ($107^{m}9$) high, lies 8 miles eastward of Tanjong Chinchin and 1½ miles offshore. Tanjong Gemarun (Gamarau), the northern extremity of Pulau Langkawi, is 379 feet ($115^{m}5$) high.

Pulau Langkawi and the adjacent islands are subject to the Sultan of Kedah, the total population, in 1931, being 12,290. The valleys and plains are well cultivated, and there are hot springs near Tanjong Gemarun. Wild pigs are numerous. Fowls, eggs and vegetables may be obtained from the numerous villages in the island.

Charts 843, 793.

Western side of Pulau Langkawi.—Between Tanjong Chinchin and Tanjong Bongkot Pennyu, 4½ miles southward, the coast is rocky and steep-to, with a few sandy beaches, backed by precipitous mountains covered with jungle.

Chart 843.

Between Tanjong Bongkot Pennyu and Tanjong Kubu, about 5½ miles south-eastward, there is a bay in which depths of less than 3 fathoms ($5^{m}5$) extend about 2½ miles offshore. About one mile eastward of Tanjong Bongkot Pennyu is Pulau Anak Borau, a wooded islet, 150 feet ($45^{m}7$) high, connected to Tanjong Borau, northward of it, by a reef. A spit, on which are some rocks, the outer of which dries 6 feet ($1^{m}8$), extends about 1½ cables southward from the islet. Sungei Borau discharges close westward of Tanjong Borau. The northern shore of the bay is rocky.

In the north-eastern corner of the bay is Kuala Melaka, where good anchorage may be obtained by small craft during the North-east monsoon. A village stands about half a mile from a rivulet which discharges in this vicinity. On the eastern side of the bay there is a long sandy beach, fringed by a bank of soft mud, rendering landing impracticable at low water. This beach is backed by low-lying land and small hills, and there are several small villages in the vicinity. The flat country is extensively cultivated and on the lower slopes of the hills coconuts are grown.

Charts 842, 830, 70, 748b.

Chart 843.

Pulau Rebak (*Lat. 6° 18′ N., Long. 99° 42′ E.*) is a flat-topped densely wooded island, 545 feet (166^{m}1) high at its south-western end, lying on the edge of the shore bank, which dries, about one mile westward of Tanjong Kubu. About midway between is Pulau Rebak kechil, 235 feet (71^{m}6) high, with a rock above water between it and Pulau Rebak. Between Tanjong Kubu and Tanjong Sawi, about 2½ miles southward, the coast is bordered by a sandy beach, but at the latter point it becomes rocky and steep-to. About 7 cables north-westward of Tanjong Sawi is Pulau Tepor, 330 feet (100^{m}6) high, and about 3½ cables farther north-westward is Tukun Babau, a rock above water.

Bass harbour.—Bass harbour is formed between the southern side of Pulau Langkawi and the north-western side of Pulau Dayang Bunting, and affords good anchorage and complete protection to a large number of vessels of moderate draught, over a bottom of soft mud, with good holding ground. The north-western side of the harbour between Tanjong Sawi and a point 5½ miles north-eastward, is a succession of rocky points interspersed by sandy or muddy coves, and backed by hills, attaining an elevation of 945 feet (288^{m}0). At the head of the harbour there is a sandy beach fringed by mud flats, which dry out to a distance of about 2½ cables.

Kuah village, the principal one of the island, stands on the eastern shore of the harbour. The District officer resides here. There is a hospital in the village.

There is regular communication by steamer with Alor Star and Penang.

About one mile southward of Kuah there is a small wooden pier, with a depth of 3 feet (0^{m}9) at its head.

The principal exports are salted fish, rubber, copra and rice.

South-western approach.—Channels.—There are two entrances to Bass harbour in the south-western approach, the western lying between Tanjong Sawi on the north, and Pulau Kentot kechil and Pulau Kentot besar, on the south, and the southern through Tyson strait, between the south-western side of Pulau Dayang Bunting and Pulau Singa besar, about one mile westward. These entrances join north-westward of Pulau Singa besar.

There are also channels between Pulau Kentot besar and Pulau Beras Basah, about 3½ cables southward, and between the latter island and Pulau Singa besar, but they are not recommended, as they are narrower and more tortuous than the main channels mentioned above.

Pulau Kentot kechil, 200 feet (61^{m}0) high, lies 1¼ miles south-westward of Tanjong Sawi, and Pulau Kentot besar, 415 feet (126^{m}5) high, lies 1½ cables eastward of Pulau Kentot kechil; both islands are densely wooded and for the greater part have bold rocky coastlines. Pulau Beras Basah, 825 feet (251^{m}5) high, with a well-defined summit, is separated from Pulau Kentot besar by Telok Tok Kaya Alang, and from the north-western side of Pulau Singa besar by Selat Simpang Tiga. The island is mostly covered with dense jungle; the western side is steep and rocky; on the northern and eastern sides there are small flat sandy beaches with off-lying coral reefs.

Pulau Singa besar is hilly and covered with dense jungle, rising to an elevation of 1,010 feet (307^{m}8) near its southern end. The southern end forms a peninsula connected by a low narrow neck of land, 545 feet (166^{m}1) high. The coasts are mostly steep and rocky, but there are

Charts 842, 830, 70, 748b.

Chart 843.

several bays on the northern and eastern sides, with mangroves at their heads. Pulau Chupak (*Lat. 6° 10′ N., Long. 99° 44′ E.*), 103 feet (31^{m}4) high, lies 4½ cables south-eastward of Tanjong Genting, the southern extremity of the peninsula.

Pulau Dayang Bunting has many high rugged limestone peaks, the highest part being near the south-western end, where a flat-topped ridge attains an elevation of 1,635 feet (498^{m}4). Close eastward and separated from it by Selat Tuba is Pulau Tuba, 985 feet (300^{m}2) high. There are two villages on each island, near which there is a little cultivation, but the remainder is covered with dense jungle. The southern and south-eastern sides of these islands are fringed by a bank, with depths of less than 3 fathoms (5^{m}5), on which lie a number of islets of similar character, precipitous and densely wooded.

Western entrance.—Dangers.—Pulau Ular, consisting of two islets, 100 and 110 feet (30^{m}5 and 33^{m}5) high, lie on a reef on the outer edge of the shore bank, about three-quarters of a mile eastward of Tanjong Sawi. A rock, with a depth of 2 feet (0^{m}6), lies about 2 cables eastward of the southern extremity of Pulau Ular. Pulau Selang, 110 feet (33^{m}5) high, lies 2¾ cables southward of Pulau Ular. A reef, which dries 4 feet (1^{m}2), lies 2¼ cables east-south-eastward of Pulau Selang.

A reef, with a depth of 8 feet (1^{m}2), lies on the southern side of the western entrance, about 7 cables southward of Pulau Selang.

Pulau Lalang, 170 feet (51^{m}8) high, lies on the outer edge of the bank which extends from the northern shore between Tanjong Sawi and Tanjong Gerak, about 2¾ miles north-eastward. Two shoals, with depths of 17 and 15 feet (5^{m}2 and 4^{m}6), lie in the fairway, 4½ cables south-south-eastward, and 5 cables south-eastward, respectively, of the western extremity of Pulau Lalang.

Two banks, with depths of from 11 to 18 feet (3^{m}4 to 5^{m}5), extend about 1¼ miles from the north-western side of Pulau Dayang Bunting. Pulau Kedera, 230 feet (70^{m}1) high, and Pulau Jerkom, 140 feet (42^{m}7) high, lie close off the edge of the south-western of these banks, about 8½ cables south-eastward, and 1¼ miles eastward, respectively, of the eastern extremity of Pulau Lalang. A shoal, with a depth of 9 feet (2^{m}7), lies close south-westward of Pulau Jerkom, and several rocks, 52 feet (15^{m}8) high, lie close north-eastward of the same islet. Several patches, with depths of 18 feet (5^{m}5), lie within 1½ miles north-eastward of Pulau Jerkom.

Tyson strait.—Tyson strait is encumbered in the middle of its southern end by an extensive mud bank, with a least depth of 12 feet (3^{m}7). Canister rock, a small square rock, 75 feet (22^{m}9) high, is the outermost of a group of islets and rocks on the eastern side of the entrance, lying about 2½ miles east-south-eastward of Pulau Chupak. About 2¼ and 2¾ miles northward, respectively, of Canister rock, on the eastern side of the strait, are Pulau Kukos, 590 feet (179^{m}8) high, and Pulau Batu Merah, 460 feet (140^{m}2) high. Pulau Jong, 225 feet (68^{m}6) high, and precipitous, lies 4½ cables north-north-westward of Pulau Batu Merah; from southward it has the appearance of a junk under sail, and, like many of the smaller islets in this part, it is undermined at the waterline. *See* view facing page **115**. Pulau Singa kechil (*Lat. 6° 14′ N., Long. 99° 45′ E.*), 320 feet (97^{m}5) high, lies about 2 cables eastward of an islet which is almost connected to the northern extremity of Pulau Singa besar.

Charts 842, 830, 70, 748b.

Chart 843.

Selat Kuah.—Light.—Selat Kuah, the eastern entrance to Bass harbour, lies between the eastern side of Pulau Tuba and the north-eastern end of Pulau Dayang Bunting on the west, and a chain of islands extending south-south-eastward from the eastern side of Bass harbour on the east. A bank, with a least depth of 7 feet (2^m1), extends nearly across the entrance, leaving, however, a narrow channel on the western side, with a least depth of 13 feet (4^m0) at its northern end.

In the southern approach to Selat Kuah are Pulau Selang besar, 66 feet (20^m1) and Pulau Selang kechil, 70 feet (21^m3) high, lying 4½ cables east-south-eastward and 5½ cables east-north-eastward, respectively, of Tanjong Rami, the southern extremity of Pulau Tuba. A rocky patch, which dries 7 feet (2^m1), lies 3½ cables north-eastward of Pulau Selang kechil and about 2¼ cables offshore.

At the southern end of the channel are several islets, the outermost of which is 195 feet (59^m4) high, situated half a mile east-south-eastward of Tanjong Peluru, the eastern extremity of Pulau Tuba. Close northward of this islet, lying on the same bank, is Nyor Setall, 220 feet (67^m1) high, and 2½ cables north-eastward of which is Pulau Enggang, 164 feet (50^m0) high. *See* view facing page 115.

A light is exhibited, at an elevation of 197 feet (60^m0), from a white iron framework tower on a concrete base, 35 feet (10^m7) in height, on Pulau Enggang.

An islet, 120 feet (36^m6) high, lies half a mile north-eastward of Tanjong Peluru. Pulau Lentang Jalan, 84 feet (25^m6) high, lies 6½ cables east-south-eastward of Tanjong Pandan, the northern extremity of Pulau Tuba.

Tidal streams.—Current.—In Bass harbour the tidal stream sets eastward and southward through Selat Kuah from 5 hours before high water till high water at Penang, and westward and northward from one hour after until 6 hours before high water at Penang; the rate of the tidal stream does not exceed one knot at springs and at neaps the stream is weak and irregular.

The direction and rate of the tidal streams at positions about 2 miles south-eastward of the south-eastern extremity of Pulau Tuba, and at the northern end of Selat Kuah are given in Tables A and B, respectively, on chart 843.

In the offing the current generally sets northward during the South-west monsoon, and southward during the North-east monsoon.

Anchorages.—Directions.—A good berth for heavy draught vessels unable to reach the head of the harbour is in a depth of 9½ fathoms (17^m4), mud, with the summit of Pulau Singa kechil bearing 178°, distant 4¾ cables.

Small vessels may obtain anchorage, in a depth of 4 fathoms (7^m3), off Kuah village, about 1¼ miles offshore, and in a greater depth off Tanjong Tarai, the north-eastern extremity of Pulau Dayang Bunting.

A vessel using the western entrance should steer about 105° to pass from 2 to 3 cables northward of Pulau Kentot besar, the least depth in the approach being 6½ fathoms (11^m9); when abeam of this island she should steer to pass from 2½ to 3 cables southward of Pulau Selang (*Lat. 6° 15′ N., Long. 99° 45′ E.*), and when the western extremity of Pulau Lalang bears 000°, she should steer to pass close north-westward of Pulau Kedera, keeping the north-western extremity of Pulau Singa besar in line astern with the south-eastern extremity of Pulau Beras

Charts 842, 830, 70, 748b.

Chart 843.

Basah, bearing 230°. Thence she should keep on the north-western side of the channel, about half a mile from the southern side of Pulau Langkawi, until the sanatorium, a detached building close to the pier, bears 090°, when she may steer for the anchorage off the village. On these courses a least depth of 18 feet ($5^{m}5$) may be carried.

A vessel entering by Tyson strait should steer 022° and pass 6 cables eastward of Pulau Chupak, and 1½ cables eastward of Tanjong Pak Kehar, situated 1¾ miles north-eastward of Tanjong Genting; when abeam of the western extremity of Pulau Batu Merah she should steer to pass midway between Pulau Jong and Tanjong Pekula, the north-eastern extremity of Pulau Singa besar; when Pulau Jong is abeam she should steer 000° until the north-western extremity of Pulau Singa besar is in line with the south-eastern extremity of Pulau Beras Basah, bearing 230°, when she should alter course north-eastward and proceed as directed above for a vessel using the western entrance. A least depth of 29 feet ($8^{m}8$) may be carried through the strait.

A vessel entering by Selat Kuah and approaching from south-eastward may pass northward of Pulau Enggang or between Tanjong Peluru on the west and Nyor Setall and the 120-foot ($36^{m}6$) islet on the east, or she may use the channel between Pulau Enggang on the east and Nyor Setall and the 120-foot ($36^{m}6$) islet on the west, but an additional sharp alteration of course is required for this channel. When abeam of Tanjong Tuba she should steer to pass close eastward of Pulau Lentang Jalan and then steer to pass midway between Tanjong Tarai and the coast of Pulau Langkawi north-eastward.

Chart 793.

Eastern side of Pulau Langkawi.—Pulau Tanjong Dendang, 950 feet ($289^{m}6$) high, and Pulau Temus, 655 feet ($199^{m}6$) high, close south-eastward, lie on the flat which extends south-eastward from Tanjong Gemarun and along the north-eastern side of Pulau Langkawi as far as Pulau Cherong (Tanjong Timun), 495 feet ($150^{m}9$) high, close off the eastern side of Palau Timun, 5½ miles southward of Pulau Temus.

Chart 843.

Pulau Timun is separated from Pulau Langkawi by a narrow strait; its summit, 1,245 feet ($379^{m}5$) high, is noticeable from southward; most of its coastline is rocky, but there are several small sandy beaches; the island is uninhabited and covered with jungle.

Fishing stakes are frequently found in the offing south-eastward of the Langkawi group, usually in depths of from 5 to 6 fathoms ($9^{m}1$ to $11^{m}0$). *See* page 20.

Between Tanjong Timun, the southern extremity of Pulau Timun, and Pulau Enggang (page 118), an extensive bank, with depths of less than 3 fathoms ($5^{m}5$), extends about 5 miles from the south-eastern side of Pulau Langkawi. Pulau Boying, 185 feet ($56^{m}4$) high, lies on this bank nearly 2 miles south-westward of Tanjong Timun (*Lat. 6° 18′ N., Long. 99° 55′ E.*), and Pulau Tubuyi, 265 feet ($80^{m}8$) high, is the outer island of the chain extending south-south-eastward from the eastern side of Bass harbour.

Chart 793.

COAST.—**Lights.**—Paknam Satul, entered between the southern end of Pulau Temlang (page 112) and Tanjong Gabus, 1¾ miles south-

Charts 842, 830, 70, 748b.

Chart 793.

eastward, is well sheltered by the off-lying islands during the South-west monsoon. It has not been surveyed, but the river is reported to have a depth of 6 feet ($1^{m}8$) as far as the town of Satul, about 10 miles above the entrance; above the town the river is shallow. There is regular communication by steamer with Penang.

Goh Yao light is exhibited, at an elevation of 265 feet ($80^{m}8$), from a white masonry tower, 23 feet ($7^{m}0$) in height, on Pulau Panjang, situated about 2 miles south-south-westward of Tanjong Gabus.

Sungei Perlis discharges 6¼ miles south-south-eastward of Tanjong Gabus; between this river and Paknam Satul, besides Pulau Panjang, are the islands of Kuning, Kurap, and Brasmana, which lie on the mudflat, from three-quarters of a mile to 3¼ miles offshore. There is reported to be a depth of 2 fathoms ($3^{m}7$) at high water in the channel over the bar off Kuala Perlis. Junks, with a draught of 6 feet ($1^{m}8$), can reach Kangar, the capital of the State of Perlis, about 4 miles from the mouth. Bukit Papan, 634 feet ($193^{m}2$) high, lies 2 miles eastward of the entrance, and should be a good mark for making the entrance.

A light is exhibited, at an elevation of 10 feet ($3^{m}0$), from the southern side of Kuala Perlis.

Batu Layang, 30 feet ($9^{m}1$) high, lies about 3¾ miles south-south-eastward of the light structure on the southern side of Kuala Perlis, and about half a mile offshore.

Sungei Kedah.—Light.—Buoyage.—Sungei Kedah, which discharges about 20 miles south-south-eastward of Kuala Perlis, has a depth of about 1½ feet ($0^{m}5$) in the channel over the bar. The navigation of the river to Alor Star presents no difficulty to vessels that can enter, if in charge of a pilot. It is necessary to moor bow and stern there.

A light (*Lat. 6° 07′ N., Long. 100° 17′ E.*) is exhibited, at an elevation of 50 feet ($15^{m}2$), from a white tower with a blue top, on the northern entrance point of Sungei Kedah.

Bukit Keriang, 699 feet ($213^{m}1$) high, is an isolated mass of limestone, honeycombed with caves, 5¾ miles north-eastward of the lighthouse at the entrance to the river, and is a good mark for making the entrance. It has the appearance, particularly from south-westward, of an elephant kneeling with its head to the southward. There is a smaller hill northward of it.

A white bell-buoy is moored about three-quarters of a mile south-westward of the lighthouse at the entrance to Sungei Kedah. A white buoy is moored on the bar within the bell-buoy.

Anchorage.—Directions.—Anchorage may be obtained, in a depth of about 4 fathoms ($7^{m}3$), about 3 miles from the entrance to Sungei Kedah.

Vessels should pass close northward of the bell-buoy and steer for the lighthouse until abreast of the white buoy, when course should be altered for the middle of the entrance to the river.

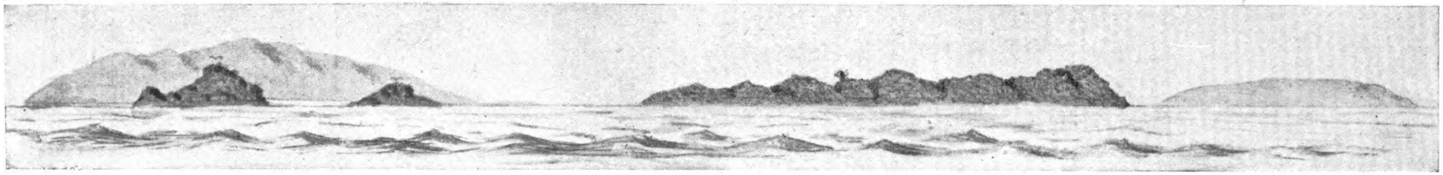
Alor Star.—Alor Star, the principal town in the State of Kedah, and residence of the Sultan, is situated about 5 miles within the entrance to Sungei Kedah. The estimated population, in 1938, was 25,350.

There is a wharf, 240 feet ($73^{m}2$) long, with a depth of about 8 feet ($2^{m}4$) alongside at Alor Star. There is regular communication by steamer with Penang.

Meteorological table.—*See* page 36.

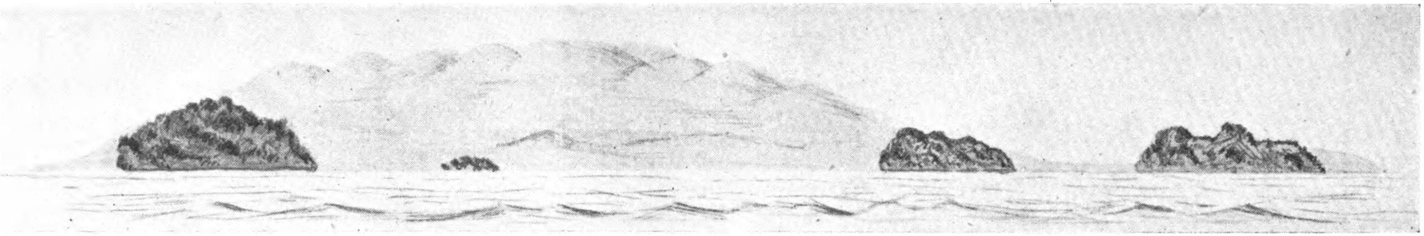
Charts 842, 830, 70, 74 8b.

To face page 121.


Pulau Lembu.
Pulau Kacha.
Pulau Paya.
Gunong Jerai.

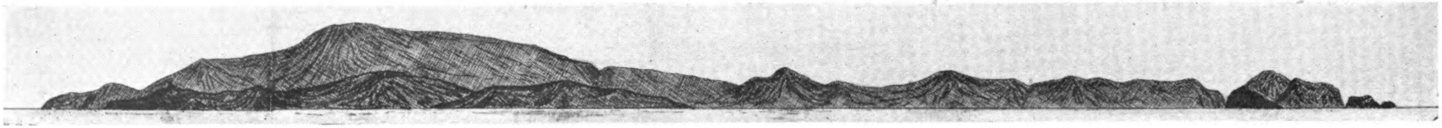
Pulau Paya, bearing 143°, distant 3 miles.

(*Original dated* 1920.)


Pulau Songsong, bearing 089°, 4 miles.
Songsong rocks.
Pulau Telor.
Pulau Bidan.

Bunting islands.

(*Original dated* 1920.)

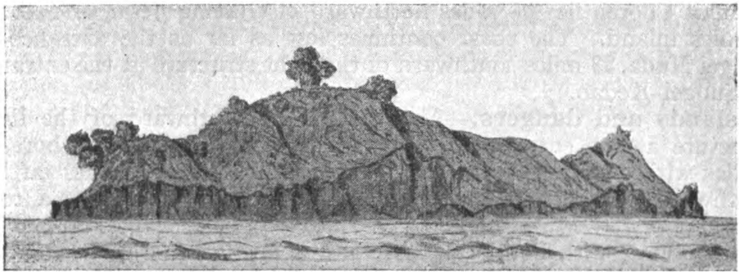

Muka head Lt. Ho.

Pulau Penang from westward.

(*Original dated prior to* 1924.)

Chart 793.

Off-lying islets.—Pulau Sagantang consists of two rocky, steep-to islets, the larger 83 feet ($25^{m}3$) high, 22 miles westward of the light structure at the entrance to Sungei Kedah.

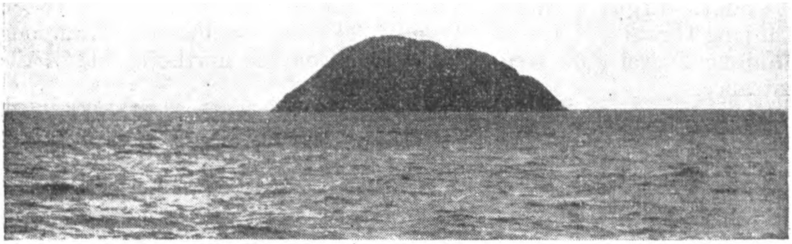


Pulau Sagantang, bearing 124°, distant one mile.
(*Original dated* 1920.)

Pulau Paya, 14¾ miles westward of the light structure at the entrance to Sungei Kedah, is 290 feet ($88^{m}4$) high, densely wooded and steep-to, except for a part of the north-eastern side. *See* view facing this page.

Pulau Lembu, about three-quarters of a mile north-eastward of Pulau Paya, is 240 feet ($73^{m}2$) high ; it is thickly wooded, and is steep-to, except on its eastern side. A rock awash lies about 1½ cables northward of the island. Between the two islands is Pulau Kacha, a rock 80 feet ($24^{m}4$) high. *See* view facing this page. Vessels are recommended not to use the channels on either side of Pulau Kacha. There are depths of not less than 12 fathoms ($21^{m}9$) within 2 cables of Pulau Paya and Pulau Lembu.

Outlying island.—Pulau Perak (*Lat. 5° 42′ N., Long. 98° 56′ E.*), a peaked barren white rock, 378 feet ($115^{m}2$) high, steep-to, and the resort of numerous sea birds, lies in the middle of Malacca strait, about 85 miles west-south-westward of the light structure at the entrance to Sungei Kedah.



Pulau Perak, bearing 112°, distant 2 miles.
(*Original dated* 1937.)

The island is often taken as a point of departure, and when the weather is cloudy during the South-west monsoon it is not unfrequently the first land seen after entering Malacca strait from northward.

Charts 1353, 1355, 830, 70, 748b.

Chart 793.

Coast.—The coast continues low and wooded for a distance of 17 miles south-south-eastward of the entrance to Sungei Kedah; at the southern end of this stretch of coast, lying about 4 miles inland, is Gunong Jerai or Kedah peak, 3,987 feet (1,215^{m}2) high.

Bukit Choreh lies 9½ miles northward of Gunong Jerai, and about 7 miles inland. The coast continues low as far as the entrance to Sungei Muda, 33 miles southward of the light structure at the entrance to Sungei Kedah.

Islands and dangers.—About 5½ miles southward of the light structure at the entrance to Sungei Kedah and 2 miles offshore, is a rock with a depth of less than 6 feet (1^{m}8); about 6 miles farther southward and 1½ miles offshore is Tokun Bavalla Banku, a rock awash.

A mudflat, with depths of less than 3 fathoms (5^{m}5), fringes the coast between the mouths of Sungei Kedah and Sungei Merbok and extends from 1¼ to 2 miles offshore until abreast of Tanjong Jaga, 4¼ miles northward of the light structure at the entrance to Sungei Merbok; here the bank commences to increase its distance from the coast, reaching a maximum of 4½ miles off Tanjong Dawai (Duri), the low northern entrance point of Sungei Merbok; it then gradually approaches the coast until abreast the northern end of Pulau Penang, where its edge is about one mile offshore.

Bunting islands consist of Pulau Bunting, Pulau Songsong, Pulau Telor, and Pulau Bidan, all of which are barren. *See* view facing page 121.

Pulau Bunting, 475 feet (144^{m}8) high, is the northernmost of the Bunting islands, and lies about 14 miles southward of the light structure at the entrance to Sungei Kedah, being separated from the mainland by a channel about one mile wide, with depths of from one to 1½ fathoms (1^{m}8 to 2^{m}7). Pulau Songsong, 4 miles south-south-westward of Pulau Bunting, is 455 feet (138^{m}7) high, and fringed by a reef which extends one cable offshore. About one mile south-westward of Pulau Songsong are the Songsong rocks, 20 feet (6^{m}1) high. Pulau Telor, 285 feet (86^{m}9) high, lies 2¼ miles southward of Pulau Songsong, and is fringed by a reef; there are depths of 7 fathoms (12^{m}8) between the two islands, and the depths decrease gradually towards the mainland. Pulau Bidan, 380 feet (115^{m}8) high, lies one mile southward of Pulau Telor, and is nearly surrounded by a reef.

Coast.—Light.—Buoy.—Sungei Merbok is entered between Tanjong Dawai and Tanjong Perepat, 1½ miles southward. Kampong Tanjong Dawai (Old Kedah) is situated on the northern side of the entrance.

There is a depth of 7 feet (2^{m}1) on the bar, with 3 fathoms (5^{m}5) inside; as far up as the town of Semiling (Similing), a distance of about 10 miles, there is a depth of 8 feet (2^{m}4).

Pulau Sayak (Sayer), 184 feet (56^{m}1) high, lies close offshore about 1¼ miles south-westward of the southern entrance point of Sungei Merbok.

A light (*Lat. 5° 41′ N., Long. 100° 22′ E.*) is exhibited, at an elevation of 22 feet (6^{m}7), from the northern side of the entrance to Sungei Merbok.

A red conical buoy is moored about 1¾ miles westward of the light structure.

A vessel approaching the entrance should pass southward of the

Charts 1355, 830, 70, 748b.

Chart 793.

buoy, and at night, keep in the *white* sector of the light between the bearings of 071° and 080°, which leads over the bar in a least depth of 7 feet ($2^{m}1$).

Chart 1366.

Sungei Muda, entered at Kuala Muda 6 miles south of the south entrance point of Sungei Merbok, has a depth of about 10 feet ($3^{m}0$) on the bar at high water. A village stands on each entrance point, and a larger one about 7 miles up the river, on the right bank. Sungei Muda is the boundary between Kedah State and Province Wellesley.

PULAU PENANG.—Pulau Penang is a British settlement separated from the mainland by a strait from 1½ to 7 miles wide, which affords sheltered anchorage for all vessels that can cross the bars at either entrance.

Province Wellesley, on the mainland, the Dindings, about 60 miles southward of Pulau Penang, and a portion of the mainland abreast them, form part of the dependency of Penang.

The estimated population of the island, in 1941, was 236,955, including about 1,900 Europeans.

Aspect.—The northern part of Pulau Penang is mountainous, and through the centre of the island runs a range of hills, decreasing in elevation as it approaches the south-western extremity, but two-thirds of the whole surface of the island is level and of gentle inclination, and, like the hills, is well-wooded. Western hill, the summit, is 2,724 feet ($830^{m}3$) high; about one mile eastward is Government hill, on which is the Government sanatorium. The western side of the island is low and wooded. *See* views on chart 1366 and facing page 121.

Northern and western sides.—Dangers.—Lights.—The northern side of Pulau Penang is fringed by a mudbank, with depths of less than 3 fathoms ($5^{m}5$), which extends as much as 1¾ miles offshore. Muka head, the north-western extremity of the island, is 748 feet ($228^{m}0$) high.

A light is exhibited, at an elevation of 795 feet ($242^{m}3$), from a grey granite tower, 45 feet ($13^{m}7$) in height, on Muka head.

There is a conspicuous house with a tower on Tanjong Batu, the northern extremity of the island, 4¾ miles eastward of Muka head.

Chart 3732.

Pulau Tikus lies 2½ miles eastward of Tanjong Batu and half a mile off the northern side of Pulau Penang. A rocky bank, on which there is a rock, 6 feet ($1^{m}8$) high, and a rock which dries 4 feet ($1^{m}2$), extends about 2 cables southward from the islet.

A light (*Lat. 5° 29′ N., Long. 100° 18′ E.*) is exhibited, at an elevation of 50 feet ($15^{m}2$), from a white stone column, 22 feet ($6^{m}7$) in height, on Pulau Tikus.

Charts 1366, 793.

The western side of Pulau Penang is fringed by a mud bank, with depths of less than 3 fathoms ($5^{m}5$), extending as much as 3 miles offshore between Tanjong Kerchut, situated about 1¾ miles southward of Muka head, and Tanjong Gertak Sanggul, the south-western extremity of the island. Tukun Kawah is a small islet lying three-quarters of a mile south-westward of Muka head lighthouse and about 4 cables offshore. About 2¼ miles northward of Tanjong Gertak Sanggul is

Charts 1366, 793.

Tanjong Masari, about half a mile northward of which is Pulau Betong. Pulau Kendi, about 2 miles southward of Tanjong Gertak Sanggul, is about 470 feet (143^{m}3) high to the tops of the trees ; its south-western side is steep-to.

A light, for the use of aircraft, is exhibited, at an elevation of 582 feet (177^{m}4), on Batu Payong, situated about 4 miles east-north-eastward of Tanjong Gertak Sanggul.

Charts 3732, 1366.

PENANG HARBOUR AND APPROACHES.—Penang harbour, situated between Pulau Penang and the mainland, has two entrance channels, North channel and South channel, the former of which has the greater depths, and is preferable at all times.

North channel.—Light-float.—Buoyage.—North channel is about 11 miles wide between Kuala Muda (page 123) and Muka head. A mudflat or bar, with depths of from 3¾ to 4¾ fathoms (6^{m}9 to 8^{m}7) over a width of about 2¾ miles, extends across the entrance, but there is a least depth of 4¼ fathoms (7^{m}8) in the fairway, and it is reported that the pilots can take a vessel of 26 feet (7^{m}9) draught through this channel at all states of the tide. From a position north-eastward of Pulau Tikus the depths in the fairway gradually increase from about 6 to 14 fathoms (11^{m}0 to 25^{m}6) to the harbour.

The coast of the mainland being low, is not so conspicuous from North channel as that of the island, consequently the latter will usually appear nearer when in the fairway between them.

Chart 1366.

A light-float, painted red, with the name " North channel " in white letters on a board, and carrying a steel framework tower amidships, exhibiting a light at an elevation of 16 feet (4^{m}9), is moored about 5½ miles north-westward of Pulau Tikus.

A white conical buoy, " D," and a red conical buoy, " E " are moored 7½ and 5¼ miles, respectively, north-north-westward of Pulau Tikus.

A conical light-buoy, No. 7, exhibiting a *white flashing* light *every seven seconds*, is moored 3 miles northward of Pulau Tikus.

A conical light-buoy, No. 8, exhibiting a *white flashing* light *every eight seconds*, is moored 2 miles east-north-eastward of Pulau Tikus.

Chart 3732.

A conical buoy, No. 9, is moored about 3½ miles south-eastward of Pulau Tikus.

Charts 3732, 1366.

Fishing stakes.—Fishing stakes extend in places about 2½ miles northward of Pulau Penang, and they should be given a good berth, as many may be broken off below water. There are two varieties of stakes ; the lighter ones, consisting of bamboos or light poles marking drift or moored nets, which can only be seen on the surface at or near low water, are found a considerable distance offshore ; the larger ones are heavy stakes moored in depths not exceeding 5 fathoms (9^{m}1).

Directions.—A vessel approaching North channel, should steer for a position about 4 miles, 345° from Pulau Tikus (*Lat. 5° 29′ N., Long. 100° 18′ E.*), passing on either side of North channel light-float, thence she should steer about 135° until the outer buildings on the point northward of the entrance to Prai river bear 160°, when she should

Charts 3732, 1366.

steer for them on that bearing until abeam of the telegraph buoy (page 127), when she may alter course for the anchorage off Georgetown (page 130).

Large numbers of fishing boats may be encountered in the vicinity of, and north-westward of Muka head.

At night, Muka head light, bearing less than 225°, leads north-westward of the fishing stakes situated northward of Pulau Penang, and Fort Cornwallis light, bearing more than 158°, leads north-eastward of them.

South channel and approaches.—Light-float.—Lights.—Dangers.—Buoyage.—South channel is half a mile wide between Pulau Rimau, situated 4½ cables southward of Tanjong Telok Tempoyak, the south-eastern extremity of Pulau Penang and white can buoy, No. 9 (*see* below), moored off the edge of the mudflat extending from the eastern shore. The dredged portion, extending 2½ miles northward from a position 6½ miles north-eastward of Pulau Rimau lighthouse, and one cable wide, had, in 1945, a least depth of 21 feet ($6^{m}4$).

Charts 3732, 1366, 793.

Great Kra flat forms the eastern side of South channel; it fronts the coast at various distances from Pulau Talang in lat. 4° 25′ N. to abreast the entrance of Prai river, a distance of 60 miles; its edge, as defined by the 3-fathom ($5^{m}5$) line, lies 9½ miles westward of Tanjong Piandang, 18 miles southward of the entrance to Prai river, and about 8½ miles from the mainland abreast the entrance to South channel, thence it tapers to a point off the entrance to Prai river. A channel, with depths of from 4 to 8 fathoms ($7^{m}3$ to $14^{m}6$), lies eastward of the northern part of this flat, leading to Prai, Juru and Bukit Tambun rivers, thence southward Great Kra flat again forms the coastal bank, and there is no channel for vessels in that direction.

Chart 793.

A light-float, painted red, with " Kra " in white letters on its sides, exhibiting a light, at an elevation of 16 feet ($4^{m}9$), from a framework tower amidships, is moored about 1½ miles from the north-western edge of Great Kra flat and about 9 miles south-south-westward of Pulau Rimau. A conical buoy, No. 4, is moored off the edge of the flat about 1¼ miles east-north-eastward of the light-float.

Chart 1366.

Pulau Rimau is about 280 feet ($85^{m}3$) high to the tops of the trees, and steep-to on its eastern side.

A light is exhibited, at an elevation of 129 feet ($39^{m}3$), from an iron tower, 57 feet ($17^{m}4$) in height, on the south-eastern extremity of Pulau Rimau.

A white can buoy, No. 9, is moored about 5¾ cables east-south-eastward of Pulau Rimau lighthouse (*Lat. 5° 15′ N., Long. 100° 17′ E.*).

Chart 3732.

Two leading lights are exhibited from beacons on Great Kra flat, the front light at an elevation of 18 feet ($5^{m}5$), about 1¾ miles east-north-eastward of the northern extremity of Pulau Jerejak (page 128), and the rear light, at an elevation of 22 feet ($6^{m}7$), about 3 cables north-eastward of the front light. These lights in line, bearing 044°, lead to the southern end of the dredged channel.

Chart 1366.

Two leading lights are exhibited on the western edge of Great Kra

Chart 1366.

flat, the front light, at an elevation of 24 feet ($7^{m}3$), from a black post surmounted by a triangle, 1½ miles south-eastward of the northern extremity of Pulau Jerejak, and the rear light, at an elevation of 30 feet ($9^{m}1$), from a black post surmounted by a black disc, about 2½ cables southward of the front lights. These lights in line, bearing 185°, lead through the dredged channel.

A light is exhibited, at an elevation of 24 feet ($7^{m}3$), from a framework beacon, No. 6, painted in black and white bands surmounted by a white ball, on the western edge of Great Kra flat, about 5½ cables north-north-eastward of the front leading light of the dredged channel.

Chart 3732.

A light is exhibited, at an elevation of 27 feet ($8^{m}2$), from a steel framework beacon, No. 4, painted in black and white bands, on the eastern side of the dredged channel, about 1½ miles northward of No. 6 light-beacon.

A can light-buoy, painted red, exhibiting a *red flashing* light *every five seconds*, is moored on the western side of South channel about 5½ cables south-south-westward of No. 4 light-beacon.

A can light-buoy, No. 3, painted red, surmounted by a triangle, exhibiting a *white flashing* light *every six seconds*, is moored on the western side of the dredged channel at its northern end, 3¾ cables north-north-westward of No. 4 light-beacon.

A conical light-buoy, No. 2, painted white, surmounted by a ball, exhibiting a *white flashing* light *every second*, is moored near the northern extremity of Great Kra flat, 2 miles northward of No. 4 light-beacon.

Chart 1366.

Fishing nets.—Fishing nets which often extend across the fairway of South channel, which are visible on the surface at or near low water, are marked by three stakes moored vertically, one over each end of the net, and one over the centre, showing about 2 feet ($0^{m}6$) above water, and appearing like ordinary fishing stakes; they may be avoided by passing between the sets of three stakes. Vessels should also avoid the fishing stakes, which frequently extend a considerable distance from the coast into the fairway.

Charts 3732, 1366.

Directions.—A vessel approaching South channel from southward should pass westward of Kra light-float (chart 793) and should not bring Pulau Kendi to bear less than 350° until Pulau Rimau lighthouse bears 040°; she may alter course to pass about 2 cables south-eastward of the latter, and thence be guided by the buoys and beacons to the anchorage off Georgetown.

Vessels of over 20 feet ($6^{m}1$) draught using South channel should employ a pilot.

At night, a vessel should approach South channel in the *white* sector of Pulau Rimau light, bearing about 040°, until within about half a mile of it, when she should alter course to pass about 1½ cables eastward of it. The *white* sector of this light between the bearings of 215° and 219° leads through South channel up to the southern end of the dredged channel. Vessels without local knowledge using South channel at night are recommended to employ a pilot.

Chart 3732.

Western side of harbour.—Lights.—Dangers.—Buoyage.—Piers.—Between Tokong point (*Lat. 5° 28′ N., Long. 100° 19′ E.*), one

Charts 793, 1355, 830, 70, 748b.

Chart 3732.

mile south-eastward of Pulau Tikus, and Fort Cornwallis, 3½ miles farther south-eastward, the north-eastern side of Pulau Penang is fringed by a bank, which dries from one to 3 feet ($0^{m}3$ to $0^{m}9$), extending 7 cables offshore.

A light is exhibited, at an elevation of 87 feet ($26^{m}5$), from a white iron framework tower, 70 feet ($21^{m}3$) in height, on the north-eastern bastion of Fort Cornwallis. An old lighthouse, on which there is a flagstaff, is situated close westward of the new lighthouse.

A red conical buoy, surmounted by an iron plate with the word "Cable" on it, is moored 5½ cables north-north-westward of Fort Cornwallis lighthouse; it marks the turning point of the telephone cable.

Swettenham pier, which has a **T**-head, is situated about 1½ cables south-eastward of Fort Cornwallis lighthouse. Vessels can proceed alongside at all times of the day or night, but will do so at their own risk and will be liable for any damage done to the pier or any Government property; they should use their own hawsers and must be moored to the satisfaction of the wharf manager. The employment of a pilot is advisable.

In 1945, there was a least depth of 15 feet ($4^{m}6$) alongside the pier. There is a crane with a lifting capacity of 7 tons and four of 3 tons. There is a landing place for boats on the western side of the pier, and there is also a lighter basin and quays equipped with cranes.

A light is exhibited from each end of the **T**-head of Swettenham pier.

Close northward of Swettenham pier is Kedah jetty and close southward are from north to south, Victoria, Church Street, and Railway piers, from the heads of which lights are exhibited, and which had, in 1945, depths, respectively, of 4, 2½ and 1½ feet ($1^{m}2$, $0^{m}8$ and $0^{m}4$) alongside. There is a pier, which dries at its head, at the mouth of Sungei Pinang, about one mile south-westward of the Railway pier; there is a tower on the end of this pier. There is a patent slip at the entrance to Sungei Pinang (*Lat. 5° 24′ N., Long. 100° 20′ E.*).

A white conical buoy, known as the Northern white mark buoy, is moored about 2 cables south-eastward of the southern end of Swettenham pier, and 2¾ cables from the eastern side of Pulau Penang. A similar buoy is moored about 4½ cables south-south-westward of the southern end of the same pier.

Middle bank extends from close off Georgetown to the northern extremity of Pulau Jerejak, 5¼ miles south-south-westward of Fort Cornwallis lighthouse. For about 1¼ miles from its northern end there are depths of from 3 to 18 feet ($0^{m}9$ to $5^{m}5$), and thence to its southern end it dries from one to 5 feet ($0^{m}3$ to $1^{m}5$). It is separated from the eastern side of Pulau Penang by Western channel, which has depths of from 3¼ fathoms ($5^{m}9$) at its southern end to 6¼ fathoms ($11^{m}4$) at its northern end.

A light is exhibited, at an elevation of 26 feet ($7^{m}9$), from a white steel framework beacon, No. 3, on a black concrete base, about 8½ cables southward of Fort Cornwallis. Vessels should not approach within one cable of this light-beacon, as there is a depth of only 6 feet ($1^{m}8$) at nearly that distance north-north-eastward of it.

Lights are exhibited from beacons, Nos. 1 to 4 on the eastern side of Western channel, and Nos. 5 to 8 on the western side, the positions of which may best be seen on the chart.

Charts 1366, 793, 1355, 830, 70, 748b.

Chart 3732.

A light (*Lat. 5° 24′ N., Long. 100° 20′ E.*) is exhibited, at an elevation of 18 feet (5^m5), from the head of the Sewage works jetty, 2½ cables south-south-westward of the dolphin mentioned above.

Two lights are exhibited, one on each side of the floating pontoon at the head of the Government Marine depot pier, situated about 1¼ miles south-south-westward of the head of the Sewage works jetty.

Syrang bank, part of which dries, lies eastward of Middle bank, within the 3-fathom (5^m5) line extending from that bank, and forms the western side of South channel for a short distance.

Between Middle bank and Great Kra flat (page 125) there are numerous shoals with depths of less than 3 fathoms (5^m5), the positions of which may best be seen on the chart.

Chart 1366.

Pulau Jerejak is 692 feet (210^m9) high. There is a conspicuous house and a white beacon on the northern extremity of the island. The quarantine station is on the north-western side, and there are two leper hospitals on the south-eastern side. Between the western side of the island and Pulau Penang there is a least depth of 2 fathoms (3^m7) in the fairway.

Batumau flat lies on the western side of South channel, between the southern extremity of Pulau Jerejak and Batumau point, situated about 1½ miles north-north-eastward of Tanjong Telok Tempoyak (page 125).

Charts 3732, 1366.

Eastern side of harbour.—Lights.—Beacons.—Between Kuala Muda and the entrance to Prai river, about 11½ miles southward, the coast is fringed by a mud bank, with depths of less than 3 fathoms (5^m5), extending as much as about 2¼ miles offshore near the northern end, tapering towards the point about one mile northward of the entrance to the river.

Chart 3732.

Lights are exhibited from three beacons on the eastern side of the harbour, east-north-eastward of Fort Cornwallis ; they form the front beacon in each case of the alignment marking the limits of the prohibited anchorage on the north, and the man-of-war anchorage and anchorage for vessels with explosives on the south. *See* page 131.

Wharves.—Lights.—Mooring buoys.—Bagan Tuan kechil pier is situated 5½ cables south-south-westward of the southernmost beacon ; about 8 cables farther in the same direction is the Straits Trading Company's wharf, and between this wharf and the entrance to Prai river are the Asiatic Petroleum Company's wharf, the Standard Oil Company's wharf, and Mitchell pier, from the head of which two lights are exhibited.

There is a mooring buoy abreast the southern end of the Straits Trading Company's wharf, and there are several off the Asiatic Petroleum Company's wharf, and Mitchell pier.

At the Asiatic Petroleum Company's wharf there was, in 1945, a depth of 31 feet (9^m4). At the Standard Oil Company's wharf there is a berth consisting of three concrete dolphins, about 60 feet (18^m3) apart, with a further dolphin, about 200 feet (61^m0) from each end of the berth and placed closer inshore, to take a vessel's head and stern ropes. In 1945, the berth had a depth of 14 feet (4^m3) alongside. The tidal streams set fair with this berth.

Charts 1366, 793, 1355, 830, 70, 748b.

Chart 3732.

Prai river.—Lights.—Light-buoy.—Both entrance points of Prai river are reclaimed land; a mud bank, which dries, extends 2 cables westward from the northern side, and three-quarters of a cable northward from the southern side.

A concrete groyne, which extends about 2½ cables west-south-westward from the northern entrance point, protects the bar at the mouth of the river from the silt which is carried by the south-going tidal stream. The depth over the bar, in 1945, was 12 feet (3^{m}7) with the Power station situated on the southern bank, 2 cables eastward of the western extremity of the wharf, bearing between 078° and 080°. These lines of bearing are indicated in each case by a front mark on the railway jetty.

A light (*Lat. 5° 23′ N., Long. 100° 22′ E.*) is exhibited, at an elevation of 18 feet (5^{m}5), from a steel framework tower on a concrete base on the outer end of the groyne on the northern side of the entrance.

A light is exhibited, at an elevation of 20 feet (6^{m}1), from each of the two black iron columns, one at each seaward corner of the wharf on the southern side of the entrance to the river.

A conical light-buoy, painted red, exhibiting a *white flashing* light *every ten seconds*, is moored in the middle of the fairway in the entrance to the river.

Close within the entrance along the southern bank of the river there are wharves connected to the railway system, with a total length of 2,600 feet (792^{m}5), and a depth, in 1945, of 15 feet (4^{m}6) alongside. Between the western end of the wharves and the reclaimed land at the southern entrance point is a basin for lighters, the greater part of which dries. Vessels not exceeding 300 feet (91^{m}4) in length, and with a draught of not more than 16 feet (4^{m}9), could, in 1945, enter the river. In 1945, there was a depth of 10 feet (3^{m}0) alongside the railway jetty.

At the head of Mitchell's pier, in 1945, there was a depth of 13 feet (4^{m}0).

Pilotage.—The pilotage district consists of the waters between Pulau Penang and Province Wellesley, bounded as follows:—

On the north of Penang by an imaginary line drawn in a 270° direction from the northern bank of Sungei Muda until it meets an imaginary line drawn in a 033° direction from Muka head lighthouse.

On the south of Penang by an imaginary line drawn in a 180° direction from the north-western end of Pasir Pandak, situated about 8 cables north-westward of Tanjong Gertak Sanggul, through the centre of Pulau Kendi, where it meets the parallel of lat. 5° 14′ N., which is the southern limit.

The employment of a pilot is optional, but it is always to a vessel's advantage to employ one, as he has the knowledge of the best available berths and those which will be shortly vacated.

Vessels arriving from southward and advising time of arrival at the pilot station, are assumed to be entering by the North channel, unless the South channel is definitely stated. Vessels intending to enter by South channel, with a draught of 23 feet (7^{m}0) or over, should advise their draught with time of arrival, giving at least 6 hours' notice. If the state of the tide does not permit the vessel entering by South channel, the master will be advised by radio accordingly, and the vessel should make for the North channel.

Charts 793, 1355, 830, 70, 748b.

Chart 3732.

The pilot motor launches are painted white, and display a flag, upper half white, and the lower half red; at night they show a *white* flare at intervals.

Charts 3732, 1366.

Tidal streams.—At springs the tidal streams run at the rate of from 2 to 3 knots through the harbour anchorages, but less in the approaches. During the North-east monsoon the tidal streams are regular, the south-going stream running from about 4 hours before to about 2 hours after high water by the shore; the north-going stream during the remaining period. Off the entrance to North channel a southerly current of half a knot has been experienced.

In November the current sets round Muka head (*Lat. 5° 29′ N., Long. 100° 11′ E.*) and overcomes the out-going stream, sometimes for 2 or 3 days.

In the offing between Penang and Parcelar point, about 17.5 miles south-eastward of the entrance to Prai river, the tidal streams during springs are regular, setting south-eastward and north-westward, at the rate of 2½ or 3 knots; each stream probably running as in the harbour anchorages as mentioned above. During neaps there is no perceptible stream.

Chart 3732.

Anchorages.—The anchorage off Georgetown, which is situated in the narrowest part of the harbour, is well sheltered, and capable of accommodating a large number of vessels. There are considerable depths close to Swettenham pier and the depths shoal gradually towards the mainland from about half a mile eastward of the pier.

Vessels anchoring among the shipping in the harbour must keep a clear hawse.

The man-of-war anchorage is north-eastward of Swettenham pier; its limits are shown by pecked lines on chart 3732.

Two beacons, which, in line, bearing 090°, indicate the northern limit of the man-of-war anchorage, stand on the eastern side of the harbour; the front beacon, from which a light is exhibited, at an elevation of 21 feet ($6^{m}4$), consists of a white post surmounted by a white diamond; the rear beacon is similar but surmounted by a white disc. The southern limit of this anchorage is also indicated by two beacons, from the western of which a light is exhibited and which in line, bear 090°.

The anchorage for foreign-going steamers is southward of the south-western corner of the man-of-war anchorage and eastward of a line drawn from this point to the Northern white mark buoy (page 127), thence in a 180° direction. Vessels must moor so as to swing clear of these lines at all states of the tide.

The anchorage for coasting steam vessels is southward of a line drawn in a direction 294° from the Northern white mark buoy and westward of a line drawn in a direction 180° from this buoy. Vessels must swing clear of these lines at all states of the tide.

Small vessels may also anchor close inshore northward of Fort Cornwallis, and westward of Kedah jetty. The anchorage for native craft engaged in the coasting trade is westward of a line joining the head of the railway pier with the southern white buoy, about 1½ cables southward, and thence to No. 3 light-beacon. Small craft must not

Charts 1366, 793, 1355, 830, 70, 748b.

Chart 3732.

anchor elsewhere in the harbour, except temporarily for purposes of navigation or through stress of weather or circumstances.

The quarantine anchorage, indicated by pecked lines on chart **3732,** is situated eastward of the northern end of Middle bank. The explosives anchorage, indicated by pecked lines on chart 3732, is situated between the man-of-war anchorage and the eastern shore of the harbour. Vessels loading or loaded with explosives are required to moor and must comply with any restrictions or conditions that may be imposed by the Port officer. They must not anchor or berth elsewhere within the port limits except with the permission in writing of the Port officer. Vessels carrying, loading, or discharging explosives must display flag B of the International Code of Signals at the masthead, and at night exhibit a *red* light from the same position. The southern limit of the explosives anchorage is indicated by the alignment of the same pair of beacons which indicate the southern limit of the man-of-war anchorage.

Foreign-going steam vessels carrying dangerous petroleum should anchor as directed by the Port officer. The anchorage for small craft carrying such cargo is westward of Middle bank ; its limits are as shown by pecked lines on chart 3732.

Prohibited anchorages.—Anchorage is prohibited in the under-mentioned areas :—

(*a*) In the area shown by pecked lines on chart 3732, bounded on the north by a line drawn 270° through the northern harbour mark until it meets a line drawn 007° from Fort Cornwallis flagstaff, thence 007° from this intersection until it meets a line 120° from Pulau Tikus lighthouse (*Lat. 5° 29′ N., Long. 100° 18′ E.*) ; on the south by the alignment of the beacons which indicate the northern limit of the man-of-war anchorage to the red telegraph buoy, thence in a 196° direction to the north-eastern side of Pulau Penang.

(*b*) Within the area shown by pecked lines on chart 3732 extending across the harbour, about one mile southward of the entrance to Prai river. Each corner of this area is marked by a beacon, lights being exhibited from the two beacons on the western side of the harbour.

(*c*) Within 20 yards ($18^{m}3$) of a line drawn between the centre of the notice boards guarding the syphon, which crosses Prai river at Jalan Bahru ferry ; it is shown on chart 3732 by a pecked line and the word " Syphon," situated about three-quarters of a mile above the entrance to the river.

(*d*) Within 20 yards ($18^{m}3$) of a line drawn between the centre of the notice boards guarding the telegraph and telephone cables which cross Prai river below the Straits S.S. Co. Dockyard ; the line is shown on chart 3732 about one mile above the entrance to the river.

(*e*) Within 20 yards ($18^{m}3$) of a line drawn between the centre of the notice boards guarding the syphon which crosses Prai river above the Straits S.S. Co. Dockyard ; it is shown by a pecked line, with the word " Syphon," on chart 3732.

Measured distance.—There is a measured distance of 6,080 feet ($1,853^{m}2$), indicated by a pecked line on the chart, through the prohibited and man-of-war anchorages. The northern end is indicated by the alignment of the beacons marking the northern limit of the prohibited anchorage ; the southern end is indicated by the alignment of the beacons marking the southern limit of the man-of-war anchorage.

Charts 1366, 793, 1355, 830, 70, 748b.

Chart 3732.

Harbour limits.—The limits of the Port of Penang are defined as follows: From the lighthouse on Pulau Tikus in a straight line to the northern harbour mark half a mile northward of Bagan Jermal in Province Wellesley, thence along the shore of Province Wellesley to the right bank of the mouth of Prai river, thence up the right bank of the said river to the pontoon bridge, thence across that bridge and down the left bank to the mouth of the said river, thence along the shore to the harbour mark situated about three-quarters of a mile northward of Sungei Juru, thence in a straight line westward through the said harbour mark to the harbour mark situated southward of the entrance to Sungei Glugor, Pulau Penang, thence along the shore of Pulau Penang to Tanjong Bunga, 4¼ miles north-westward of Fort Cornwallis, and thence in a straight line to the said lighthouse on Pulau Tikus, including Sungei Pinang as far as Dato Kramat bridge, and all creeks and waterways between the southern harbour mark on Pulau Penang and the lighthouse on Pulau Tikus, and including all piers, jetties, landing places, wharves, quays, docks, and other similar works within the limits above set out, whether within or without the line of high-water mark, and (subject to any rights of private property therein) all portions of the shore or bank within 50 yards (45$^{\text{m}}$7) of high-water mark.

Georgetown.—Georgetown, the capital, is situated at the north-eastern extremity of Pulau Penang, and had, in 1938, a population of 164,502, over half of whom are Chinese. The town, which is known to the Malays as Tanjong, stands on level ground.

Signal station.—Fort Cornwallis (*Lat.* 5° 25′ *N.*, *Long.* 100° 21′ *E.*) is situated on the north-eastern point of the island, and is the port signal station, the flagstaff being close to the lighthouse.

The signal station is in telephonic communication with the lighthouses at Muka head and Pulau Rimau, and the Harbour master's department on Victoria pier, from which the latest information regarding the arrival of vessels may be obtained.

Chart 1366.

There is a signal station on Government hill, through which messages will be received and transmitted through Lloyd's.

Chart 3732.

Harbour regulations.—Aircraft signals.—No person in charge of any launch, boat, or sampan, shall land any passenger or other person between the following limits: A line from Tokong point police station to the harbour mark northward of Bagan Jermal, in Province Wellesley, and a line from the southern harbour mark on Pulau Penang to the southern harbour mark on Province Wellesley shore, except at the following places:—

On Pulau Penang at the cattle ramp, situated northward of Fort Cornwallis, and on the beach for a distance of 150 feet (45$^{\text{m}}$7) on each side of it, the Fort jetty, Victoria pier, Church street pier, Acheen street Ghaut jetty, Swettenham pier, and the Railway jetty.

On the mainland at Bagan Tuan kechil pier, and the beach for a distance of 150 feet (45$^{\text{m}}$7) on either side of it; the Jalan Bahru ferry in the Prai river; the wharves of the Straits Trading Company, the Asiatic Petroleum Company, the Standard Oil Company and Mitchell's pier; the Prai wharves; the railways' station pier at Prai; and the Straits S.S. Co. Dockyard at Sungei Nyok.

Charts 1366, 793, 1355, 830, 70, 748b.

Chart 3732.

A vessel entering the port is required to display, in addition to her National ensign and signal letters, the following flags :—

Flag Q of the International Code of Signals and the signal XGQ if coming from an infected port, or FPB if from a suspected port, or KQA when carrying more than 25 Chinese or Indian coolie immigrants or pilgrims.

A *red* light over a *white* light is the corresponding signal at night time.

Articles Nos. 24–36, with the exception of articles 25 (2), 27 (2), and (3), 31 (2), and 34, of the Port regulations for Singapore (*see* Appendix I), also apply to the Port of Penang. In article 35 (1) the night signal, a *green* light over a *red* light, does not apply to Penang.

Vessels when carrying not less than 25 alien deck passengers shall display International Code pendants 34, and in every other case, with such passengers onboard shall display pendants 25.

When seaplanes are due to arrive at or leave Glugor, navigation is restricted in the Western channel, i.e., the water area between Middle bank and Pulau Penang ; the area is bounded as follows :—

On the north by a line drawn in a 065° direction from the light on the Sewage works pier to the low water line on Middle bank.

On the south by a line drawn in a 270° direction from the white beacon on the northern end of Pulau Jerejak (*Lat.* 5° *20′ N., Long. 100° 19′ E.*).

On the east and west by the low water lines of Middle bank and Pulau Penang, respectively.

The following signals are shown from a signal mast on the Government Marine depot pier at Glugor, when seaplanes are due to arrive or leave :—

By day.—A black ball above a white ball, 10 feet ($3^{m}0$) apart.

At night.—A *green* light above a *white* light, 10 feet ($3^{m}0$) apart.

When these signals are shown vessels navigating in the area must keep close inshore.

The following is taken from the Penang Port Rules :—

11 (b). Vessels using the Western channel, i.e. the stretch of water between Middle bank and the island of Penang, shall keep well clear of seaplanes using this area and, when seaplanes are alighting or taking off, all craft shall keep inshore, leaving mid-channel clear.

Trade.—Shipping.—Penang is a free port. The principal exports are rubber, tin, copra, sugar, pepper, spices, tapioca, tortoise shell, areca nuts, tobacco, hides, rattan, gum and coffee ; the chief imports are piece goods, iron and cutlery.

In 1939, a total of 4,426 merchant vessels (exclusive of vessels of 75 tons and under), of 11,470,618 tons, entered and cleared the port of Penang.

Harbour facilities.—Coal and fuel oil may be obtained. Oiling can be carried out alongside the wharf at the Asiatic Petroleum Company's installation at Butterworth, which will accommodate a vessel of about 500 feet ($152^{m}4$) in length and a maximum draught, in 1945, of 20 feet ($6^{m}1$) ; the oil is pumped onboard at a rate of 115 tons per hour, or at the anchorage from a motor lighter at 110 tons per hour.

Large repairs to vessels' engines and boilers are undertaken at the Penang Harbour Board establishment at Prai, and at the Straits S.S. Company's dockyard at Sungei Nyok, where there are sheer legs of

Chart 3732.

40 tons lifting capacity ; there are also cranes with lifting capacities of from 1½ to 10 tons.

There are three patent slips at Prai. *See* page 379.

There are several tugs and numerous lighters available.

Water is laid on to the piers.

There is a hospital situated about 2¼ miles westward of Swettenham pier, and a convalescent bungalow on the summit of Government hill (chart 1366).

Quarantine.—The quarantine station and leper hospital are on Pulau Jerejak.

Deratisation, *see* page 17.

Communication.—Radio station.—There is communication by steamer with other ports in the Malay peninsula and Netherlands East Indies.

Meteorological table.—*See* page 37.

Ferry steamers ply between the Railway pier at Georgetown and the wharf on the southern side of the entrance to Prai river.

There is a radio station at Penaga (chart 1366) on the mainland, about 3½ miles south-eastward of Kuala Muda. *See* page 16.

Coast.—Sungei Juru flows out 2¼ miles south-south-eastward of Prai river, its mouth nearly drying ; within there are depths of about one fathom (1^m8). Mud flats extend about 1½ miles from the entrance.

Chart 1366.

Sungei Jajawi (Bukit Tambun), entered about 3½ miles southward of Sungei Juru, has a depth of only one foot (0^m3) over the bar, but within there are depths of from one to 3 fathoms (1^m8 to 5^m5). It joins Sungei Tengah on the eastern side of Pulau Batu Kawan.

Kra islands lie about one mile off the entrance to Sungei Jajawi. North Kra is 337 feet (102^m7) high at its northern end and densely wooded ; there is a small but fairly noticeable quarry at its northern end ; there are steep cliffs on the western side of the island. South Kra, which is 356 feet (108^m5) high, has a large and noticeable Malay village at its northern extremity ; the summit and the slopes northward of it are extensively cultivated, elsewhere the island is densely wooded. South Kra is separated from North Kra by a passage about one cable wide, with a depth of 3 feet (0^m9). There is a channel, with a least depth of 5 fathoms (9^m1), leading from Georgetown to within one mile of North Kra (*Lat. 5° 17′ N., Long. 100° 23′ E.*), and from 4 to 3 fathoms (7^m3 to 5^m5) for some distance southward of the islands ; here it becomes blocked by the Great Kra flat.

Krian bank, which dries, lies close southward of South Kra, on Great Kra flat.

Sungei Krian, which flows out about 5½ miles southward of the southern entrance point of Sungei Jajawi, is navigable by boats not exceeding a draught of 6 feet (1^m8) as far as Parit Buntar (chart 793), about 6 miles from the entrance, and is reported to be navigable for craft of about 4 feet (1^m2) draught for a distance of 40 miles from the entrance. It is an important outlet both to Province Wellesley and to Perak. There is a factory and chimney between the Krian and Tengah on the Byram estate, and there are other factories on the estates farther northward.

Charts 1366, 793, 1355, 830, 70, 748b.

CHAPTER V

MALACCA STRAIT, EASTERN SHORE—PENANG TO TANJONG PIAI

Chart 793.

COAST.—Light.—Between Kuala Krian and Tanjong Krang, about 23 miles south-south-eastward, the coast forms several bights, is low and densely wooded, and fringed by flats, with depths of less than 3 fathoms (5m5) in places, extending 12½ miles offshore, being the continuation southward of Great Kra flat.

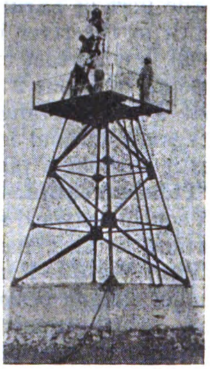
There is practically a continuous strip of mangrove forest, which is 7 miles wide in places, from Prai river to the False Dindings, about 62 miles southward. These mangroves are gradually creeping seaward as the deposits increase. Mangrove forest only grows between the level of high water neaps and that of high water springs.

About 2½ miles southward of Kuala Krian is the southern boundary between Province Wellesley and Perak, which runs in a direct line eastward to Parit Buntar, on Sungei Krian. About 5½ miles southward of Kuala Krian is Tanjong Piandang, and 14 miles farther south-eastward is Tanjong Pasir, which may be identified by the sandy beaches on the northern and southern sides of it, the only sand in the vicinity.

Kuala Kurau and Kuala Gula are situated about 5 and 10 miles, respectively, southward of Tanjong Piandang; the former is the mouth of a considerable stream, but its bar is extending, its northern bank is advancing seaward, and the entrance becoming encumbered with shoals. Both streams, however, are navigable, and from both there is regular communication by steamer with Georgetown.

A light (*Lat. 5° 00′ N., Long. 100° 26′ E.*) is exhibited, at an elevation of 27 feet (8m2), from an iron framework structure on a concrete base, on the northern side of Kuala Kurau.

Selinsing bay is entered on the southern side of Tanjong Pasir; at its northern end is Selinsing channel, and at its southern end is the entrance to Sungei Sangga (Sengar) besar, both of which lead to Port Weld, but the former by a very circuitous route. In 1932, it was reported that it was impracticable for a vessel drawing more than 4 feet (1m2) to enter Port Weld by these channels at low water, as the entrance was silting up rapidly.



Kuala Kurau light-structure.
(*Original dated* 1933.)

Charts 1355, 748b.

Chart 793.

The bay is fringed by the coastal flat which forms a bar 2 miles wide, with a depth of about 3 feet (0m9), mud, sand, and shells, in the approach to both these channels.

About 4½ miles within the entrance of Sungei Sangga besar is Pulau Sapetang or Pulau Kechil, which is connected to the shore southward and westward of it at low water; the channel lies on the northern side of the island; the depth over the bank in the approach to Port Weld is from 2 to 4 feet (0m6 to 1m2), thence about 12 feet (3m7) to Port Weld, and abreast the wharf there are from 3 to 4 fathoms (5m5 to 7m3); alongside the wharf there is a depth of 10 feet (3m0).

The coast from the southern entrance point of Sungei Sangga besar to Tanjong Krang, about 3 miles southward, is mangrove jungle, covered for some distance inland at high water springs.

Fishing stakes.—On the flats between Pulau Penang and Pulau Talang, about 52 miles south-south-eastward, there are numerous fishing stakes extending several miles offshore, but generally within the 3-fathom (5m5) line.

Local weather.—*See* page 28.

Kuala Larut.—Light.—Buoys.—Kuala Larut is about 2 miles wide at its entrance between Tanjong Krang and Tanjong Burong, but the navigable channel, which is marked by buoys, is much narrowed by mudflats, which dry, extending from its shores. A bar, about 2½ miles wide, with a depth of 4 feet (1m2), fronts the entrance, inside which the depths increase to about 2 fathoms (3m7).

A light (*Lat. 4° 47′ N., Long. 100° 34′ E.*) is exhibited, at an elevation of 15 feet (4m6), from an iron beacon on the southern side of the fairway to Kuala Larut.

Sungei Limau is separated from Sungei Larut by a mudbank 3 miles long, which dries in patches, extending seaward from Trusan Siamang, about 4 miles east-north-eastward of Tanjong Burong; the channel inside Larut bar to Sungei Limau has a depth of about 2 fathoms (3m7), and is marked by fishing stakes.

Telok Kertang, about 7 miles within the entrance to Kuala Larut, is the port of Larut, and has a wharf and Custom house. The least depth in the river is abreast Trusan Siamang, where there is 4 feet (1m2), but abreast the town, the river is 120 yards (109m7) wide, with a depth of about 2 fathoms (3m7); in 1931, however, it was reported that Telok Kertang was silting up rapidly.

Vessels without local knowledge should not attempt to enter Kuala Larut without a pilot, who may be obtained from Penang.

Tidal streams.—About 2 miles off Tanjong Krang the tidal streams set south-eastward and north-westward, at a rate of 1½ knots, probably turning as at Penang. *See* page 130.

Port Weld.—Port Weld is situated 5 miles above the entrance to Sungei Sangga besar, at the junction of that river with Sungei Sapetang, which trends northward from Kuala Larut, by which route, although a longer one, Port Weld can be reached. At the entrance to Sungei Sapetang there is a short bar, with a depth of 6 feet (1m8).

Port Weld is the port of Taiping, the capital of Perak, about 8 miles eastward, to which it is connected by rail and thence with the general system.

There is a wharf, 180 feet (54m9) long, from which two **T**-headed piers extend, with a depth of 6 feet (1m8) alongside.

Charts 1355, 748b.

Chart 793.

The principal exports are rubber and tin ; the chief import is rice.

A vessel approaching Port Weld by Sungei Sangga besar should cross the bar by passing close northward of two beacons ; no difficulty should be experienced in navigating small craft to Pulau Sapetang.

For Port regulations, *see* Appendix II.

Taiping.—Taiping is the seat of Government of the State of Perak, and also its second largest and principal town. There are two Government rest houses in the town. The Resident is stationed here.

The chief product is tin, obtained from the mines in the district.

The exports consist of tin, attaps, firewood, sugar, rattans, timber, fruit, and salt fish ; the imports are specie, rice, opium, live stock, oil, piece goods, and provisions.

Coast.—Aspect.—Light.—Eastward and south-eastward of Taiping, and about 15 miles inland, mountains rise from the plains, the principal being Gunong Hijau, 4,747 feet ($1446^{m}9$) high, about 4½ miles eastward of Taiping, and Gunong Bubu, 5,430 feet ($1655^{m}1$) high, about 10 miles southward of Gunong Hijau. Except in the rainy season, from about June to November, the summits are seldom visible.

Between Tanjong Burong (*Lat. 4° 39′ N., Long. 100° 36′ E.*) and Tanjong Hantu, about 27 miles southward, the principal rivers which discharge are the Trong, Jarum Mas, and Bruas, all fringed by the mudbank which extends with depths of less than 3 fathoms ($5^{m}5$), from 14 miles westward of Tanjong Burong to 8 miles westward of Tanjong Pasir Ringgit (Remis), the northern entrance point of Kuala Jarum Mas.

The Trong and Bruas are navigable by canoes for about 60 miles ; the Jarum Mas is merely a tidal estuary.

At Pasir Hitam, on the southern side of Kuala Trong, about 1¼ miles from the southern entrance point, there is a Customs shed and a police station. A concrete jetty was under construction in 1931.

The boundary between Perak and the Dindings territory lies southward of the southern entrance point of Kuala Jarum Mas, whence it extends in a direct line eastward to the boundary stone on Gunong Sunting Baloh, and thence to Tanjong Katak, 23 miles south-south-westward.

False Dindings is formed by the two highest peaks of a short range of hills near the coast about 10 miles southward of the southern entrance point of Kuala Jarum Mas ; approaching from northward they resemble Pulau Pangkor, about 8 miles south-south-westward.

About 3 miles north-north-westward of False Dindings is Pulau Talang, 259 feet ($78^{m}9$) high, about a quarter of a mile offshore. About 2½ miles west-south-westward of Pulau Talang is the northern extremity of North bank, which extends, with depths of less than 3 fathoms ($5^{m}5$), about 8½ miles northward from Pulau Pangkor, with a channel, with a least depth of 3¼ fathoms ($5^{m}9$) between it and the coast.

Chart 792.

Tanjong Hantu is a sloping point, rising to Bukit Tanjong Hantu, about 596 feet ($181^{m}7$) high, about three-quarters of a mile northward.

A light is exhibited, at an elevation of 180 feet ($54^{m}9$), from a grey brick tower, 20 feet ($6^{m}1$) in height, on Tanjong Hantu.

The coast from Tanjong Hantu to Motts point, about 3½ miles south-south-eastward, is fringed by a bank, with depths of less than 3 fathoms ($5^{m}5$), the outer edge of which lies on the line joining the

Charts 1355, 748b.

Chart 792.

two points. At the southern end of the bank, within about three-quarters of a mile of Motts point, are two patches which dry.

Grant bluff or Tanjong Labohan Bilek, about 1½ miles south-eastward of Tanjong Hantu, and Mudge bluff or Tanjong Senangin, about one mile farther southward, are both high and form the western extremities of ranges of hills. These points divide this coast into three shallow bays, the northern of which is Telok Bilek, the centre Telok Senangin, and the southern Telok Kupia. There are numerous fishing stakes on the banks.

PULAU PANGKOR.—Pulau Pangkor or Great Dinding island is separated from the mainland by Dindings channel, about one mile wide, but navigable only over a width of about 3 cables. The island is mountainous and densely wooded, Bukit Pangkor, about 2 miles from the northern extremity, being 1,222 feet ($372^{m}5$) high, and South summit or Bukit Telok Gedong, about half a mile northward of Tanjong Siapu (Fly point), the south-western point, 899 feet ($274^{m}0$) high. *See* view facing this page.

Western and southern sides of Pulau Pangkor.—Islands and dangers.—The western coast of Pulau Pangkor is deeply indented, forming Telok Belanga, Telok Nipah or West anchorage, Telok Ketapang (Kalapang), and a large bight between Tanjong Siapu (*Lat. 4° 11′ N., Long. 100° 34′ E.*) and Turtle point, about 1¾ miles north-westward of it.

Telok Belanga, entered between North West point or Tanjong Batu Puteh, the north-western extremity of the island, and Reed bluff or Tanjong Nipah, about one mile southward, shoals gradually to its head and is free from danger.

Telok Nipah is entered between Reed bluff and the western extremity of Long island or Pulau Mentangor (Tokong), one mile south-south-westward. Near the middle of the bay, about 2 cables from the head, is Rat islet or Pulau Giam (Tikus), about 135 feet ($41^{m}1$) high. Long island, about 158 feet ($48^{m}1$) high at its western end, is separated from Pulau Pangkor by a passage which is about half a cable wide and foul.

A bank, with a least depth of 29 feet ($8^{m}8$), extends 1¼ miles southward from the southern extremity of Long island.

Telok Ketapang, lying between the southern side of Long island and Turtle point, is fringed by a bank with depths of less than 3 fathoms ($5^{m}5$), extending about 1½ cables offshore.

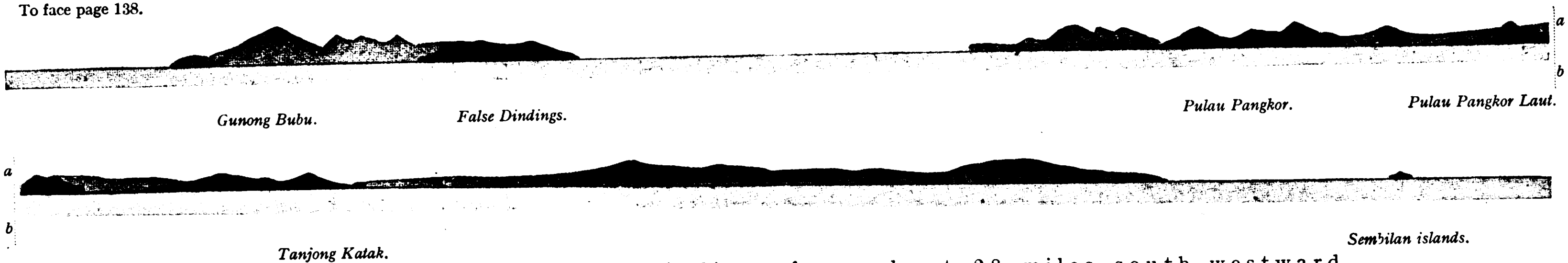
Inner islets, consisting of Turtle rock, 26 feet ($7^{m}9$) high, and a wooded islet, 104 feet ($31^{m}7$) high, 1¼ cables southward of it, lie on a spit which extends 3 cables southward from Turtle point.

In the bight between Turtle point and Tanjong Siapu, a bank, with depths of less than 3 fathoms ($5^{m}5$), extends about half a mile offshore from Kampong Pasir Bogak near the northern end.

Pulau Pangkor Laut, about 272 feet ($82^{m}9$) high, and densely wooded, lies about half a mile southward of Turtle point; its northern and eastern sides are fringed with reefs and rocks above water, but its western and southern sides are fairly clear and steep-to a short distance offshore. An islet, about 28 feet ($8^{m}5$) high, lies close northward of the north-western point. A shoal, with a least depth of 2 fathoms ($3^{m}7$), lies from one to 4 cables eastward of the south-eastern end of the island, and a bank, with depths of less than 6 fathoms

Charts 793, 1355, 748b.

To face page 138.


a
b
Gunong Bubu.
False Dindings.
Pulau Pangkor.
Pulau Pangkor Laut.
a
b
Tanjong Katak.
Sembilan islands.

View, in two parts, of the Dindings from about 28 miles south-westward.

(*Original dated* 1902.)

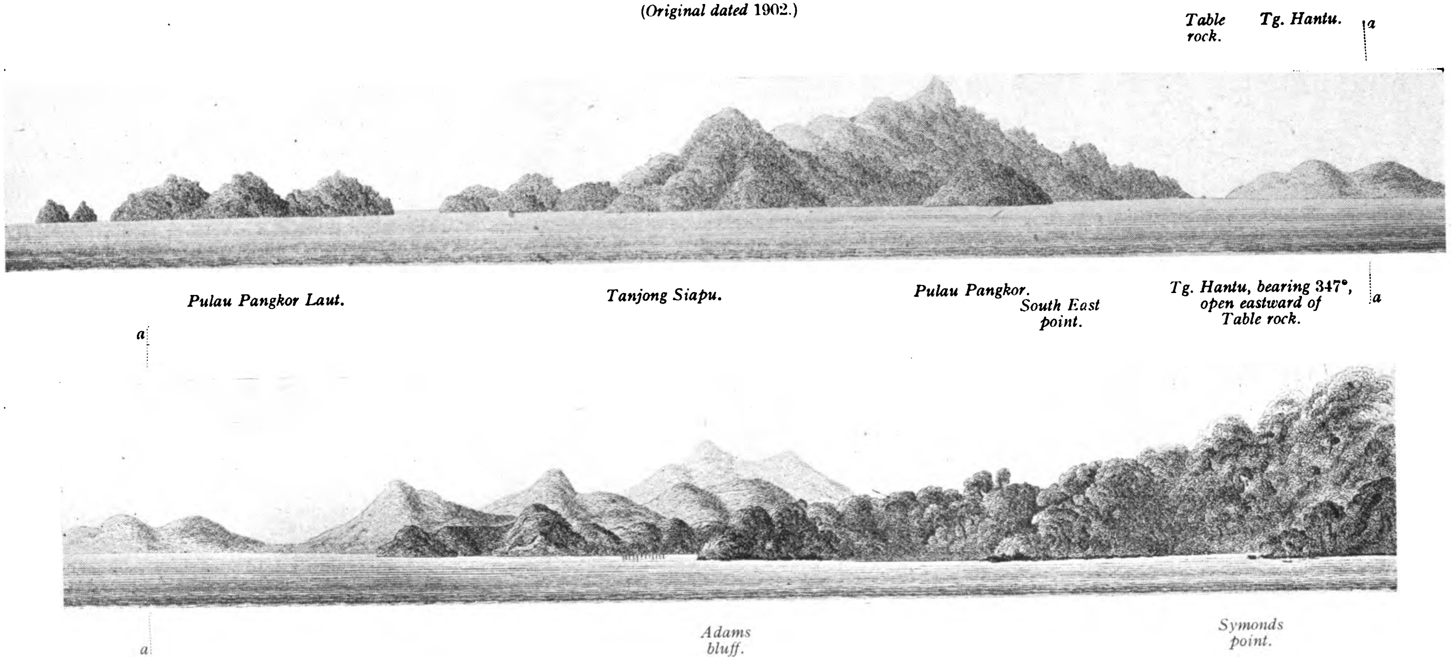


Table rock.
Tg. Hantu.
a
Pulau Pangkor Laut.
Tanjong Siapu.
Pulau Pangkor.
South East point.
Tg. Hantu, bearing 347°, open eastward of Table rock.
a
a
a
Adams bluff.
Symonds point.

View, in two parts, of Dindings channel from southward.

(*Original dated* 1877.)

Chart 792.

(11^{m}0), extends 8 cables eastward from the south-eastern point. On the north-western end of the shoal is a group of rocks, 6 feet (1^{m}8) high, and a rock, 12 feet (3^{m}7) high, lies close south-eastward of the south-eastern point.

Outer islets (*Lat. 4° 11′ N., Long. 100° 32′ E.*) are two wooded islets about 135 and 140 feet (41^{m}1 and 42^{m}7) high, respectively, lying close off the south-western point of Pulau Pangkor Laut.

The south coast of Pulau Pangkor between Tanjong Siapu and South East point, is steep-to. Telok Sekadeh (Secadas) is a small bight lying in the middle of this coast.

The northern and eastern coasts are described with North entrance (*see* below) and South entrance on pages 140–141.

Anchorages.—Anchorage may be obtained in the middle of Telok Belanga, in a depth of about 4½ fathoms (8^{m}2), about 3½ cables north-north-eastward of Reed bluff, and in West anchorage, in a depth of about 4½ fathoms (8^{m}2), 2¼ cables westward of Pulau Giam.

Anchorage may be obtained about midway between the middle of the eastern side of Pulau Pangkor Laut and Pulau Pangkor, in a depth of about 8 fathoms (14^{m}6).

Tidal streams.—The tidal streams set northward and southward off the western side of Pulau Pangkor.

DINDINGS CHANNEL.—Depths.—Dindings channel has two entrances. North entrance, between the northern end of Pulau Pangkor and North bank, has a bar at its inner end, and although a depth of not less than 3¼ fathoms (5^{m}9) can be carried through, the passage is narrow, and Bower and Michael patches lie in and near the fairway; it is not recommended for vessels of over 12 feet (3^{m}7) draught. South entrance, between the south-eastern end of Pulau Pangkor and East bank, has a least depth of 7 fathoms (12^{m}8) in the fairway to the anchorage off Pangkor. Vessels of 18 feet (5^{m}5) draught can proceed at all times to Lumut in Dindings river. The least depth in the fairway on the bar in River passage which connects Dindings channel to the river, is about 23 feet (7^{m}0).

North entrance. — Islets and dangers. — Light. — Buoy. — Beacon.—North bank or Beting Batu Malang, has, except for a small patch which is awash, situated about 1¼ miles north-westward of the south-eastern extremity, general depths of from 3 to 18 feet (0^{m}9 to 5^{m}5), mud, sand, and shells; it extends from a position about 7 cables north-eastward of Tanjong Awang Chik (Scorpion point), the north-eastern extremity of Pulau Pangkor, to a position 2½ miles west-south-westward of Pulau Talang (chart 793) (page 137).

Wedge rock or Batu Malang, about 3 feet (0^{m}9) high, lies on North bank about one mile south-westward of Tanjong Hantu. Two outlying patches, with depths of 17 and 18 feet (5^{m}2 and 5^{m}5), lie about 8 cables westward and west-south-westward, respectively, of Wedge rock.

Pulau Tukun Terindak (North West islet), 100 feet (30^{m}5) high, and wooded, lies 5½ cables north-north-westward of North West point, and on the south-western side of North entrance; a spit extends about three quarters of a cable southward from the islet.

A rock, about 7 feet (2^{m}1) high, lies between Pulau Tukun Terindak and Pulau Pangkor.

Charts 1009, 793, 1355, 748b.

Chart 792.

The coast of Pulau Pangkor between North West point and North point is fringed by a bank, with depths of less than 3 fathoms ($5^{m}5$), extending about 1¼ cables offshore. About midway between the two points, lying on this bank is Grasshopper islet or Pulau Pelandok, about 121 feet ($36^{m}9$) high, and wooded, and a rock, above water, close northward of it.

Offlying rocks or Batu Mandi (*Lat. 4° 16′ N., Long. 100° 33′ E.*), 2 feet ($0^{m}6$) high, lie 2½ cables eastward of North point, with a depth of 3 feet ($0^{m}9$) close westward.

Telok Dalam, between North point and Tanjong Awang Chik, is a shallow bight, with depths of less than 3 fathoms ($5^{m}5$), extending one cable outside the line joining the two points, with a 5-foot ($1^{m}5$) patch lying on this line about a quarter of a mile north-westward of Tanjong Awang Chik.

A white obelisk stands on Tanjong Awang Chik.

A bank, with depths of less than 3 fathoms ($5^{m}5$), extends 2 cables north-eastward from Tanjong Awang Chik. Charybdis rock consists of two separate pinnacles with depths of from 3 to 4 feet ($0^{m}9$ to $1^{m}2$), lying in a north and south direction, about 1¼ cables northward of Tanjong Awang Chik with some rocks above water between the southern rock and the point.

Bower patch, with two heads, each with a depth of 19 feet ($5^{m}8$), lies nearly in mid-channel northward of Tanjong Awang Chik, and constitutes the shoalest part of the bar.

Michael patch, with a least depth of 14 feet ($4^{m}3$) at the northern end, lies with its southern end about 3¼ cables eastward of Tanjong Awang Chik.

A white conical buoy, the position of which cannot be depended on, marks the southern end of North bank.

A light is exhibited, at an elevation of 18 feet ($5^{m}5$), from a screw pile beacon, surmounted by a white ball, on River passage beacon, situated at the northern extremity of East bank, and 9 cables eastward of Tanjong Awang Chik.

Table rock, 12 feet ($3^{m}7$) high, lies close offshore, about one mile south-south-eastward of Tanjong Awang Chik, and at the southern end of Telok Chempadak, a shallow bight.

South entrance.—Dangers.—Lights.—Fairway rock, 21 feet ($6^{m}4$) high, lies in the approach to South entrance, about 4 miles south-south-westward of South East point. A shoal, which dries 3 feet ($0^{m}9$), lies about half a cable northward of the rock, and a rock, awash, lies close eastward of the northern end.

About 2¼ miles eastward of Fairway rock is the north-western extremity of a bank, with depths of less than 6 fathoms ($11^{m}0$), which extends north-westward from the mouth of Perak river.

An extensive bank, with depths of from 6¼ to 10 fathoms ($11^{m}4$ to $18^{m}3$), extends 2 miles south-eastward from a position about half a mile from the south-eastern extremity of Pulau Pangkor Laut. Another bank, with similar depths, extends three-quarters of a mile southward from the southern side of Pulau Pangkor.

The coast between Tanjong Katak, which lies on the boundary between the southern end of the Dindings territory and the State of Perak, and Mehegan point or Tanjong Batu Puteh, about 5½ miles northward, is fringed by an extensive mud flat, known as East

Charts 1009, 793, 1355, 748b.

Chart 792.

bank, the western edge of which forms the eastern side of Dindings channel.

Pulau Katak, a wooded islet, about 114 feet (34^m7) high, lies on the edge of the flat extending half a mile westward from Tanjong Katak.

A light is exhibited, at an elevation of 90 feet (27^m4), from a white brick tower, 30 feet (9^m1) in height, near the northern end of Pulau Katak.

There is a shoal patch about midway between Pulau Katak and Symonds point, 4½ cables northward; this point and Adams bluff, 1¾ miles northward, are noticeable. Telok Murok, entered about half a mile farther northward, almost entirely dries; at its northern end, about one cable offshore, are the Bremner rocks, about 5 feet (1^m5) high.

A narrow ridge of East bank, parts of which dry, extends northward, midway between Pulau Pangkor and the mainland, from a position about 1½ miles northward of South East point, for about 2¼ miles, to abreast the entrance to Dindings river.

Tomb point, on the western side of the channel and about one mile northward of South East point (*Lat. 4° 11′ N., Long. 100° 35′ E.*), separates Telok Gedong on the south from another bight on the north. Both bights are encumbered with shoals and rocks above and below water, which extend out to the line joining their entrance points. Kampong Telok Gedong is situated at the head of Telok Gedong and Pangkor or Kampong Raja Bayang near the northern end of the northern bight. These villages are inhabited by native fishermen.

A light is exhibited, at an elevation of 15 feet (4^m6), from a white stone pillar, 8 feet (2^m4) in height, on Hospital rock, 6½ cables northward of Tomb point.

Anchorage.—Anchorage may be obtained, in a depth of 9 fathoms (16^m5), in mid-channel eastward of Kampong Sungei Pinang besar, situated 6 cables northward of Pangkor.

Prohibited anchorage.—Anchorage is prohibited in an area extending from close southward of Tomb point to the opposite shore; the limits are shown in pecked lines on the chart and are marked by four white beacons each surmounted by a triangle.

Port limits.—The limits of the Port of Dindings are defined as follows:—

Commencing from the Harbour mark at Tanjong Awang Chik the boundary runs in a straight line to the Harbour mark at Motts point, thence along the right bank of Dindings river, and both banks of its tributaries along that bank as far as they are navigable, thence returning along the left bank of Dindings river and both banks of its tributaries along its left bank as far as they are navigable and fall within the Territory of the Dindings to Mehegan point at its mouth, thence southward along the shore to Adams bluff, thence in a straight line to the Harbour mark at the south-eastern point of Pulau Pangkor, thence northward along the shore of Pulau Pangkor to Tanjong Awang Chik, including all piers, jetties, landing places, wharves, quays, docks, and other similar works, situated within the limits above set out, whether within or without the line of high water mark, and (subject to any rights of private property therein) any portion of the shore or bank within 50 yards (45^m7) of high water mark.

Charts 1009, 793, 1355, 748b.

Chart 792.

Port regulations.—Every vessel within the limits of the port shall anchor while discharging passengers or cargo.

No vessel shall anchor in such a manner as to obstruct the fairway of any river or channel within the port limits.

All small craft navigating Dindings river or Dindings channel shall keep out of the way of steamers.

Free passages shall be kept to all piers, jetties, wharves, landing places, and all vessels and rafts shall move without delay when so directed by the Port officer or any Police officer.

Articles Nos. 24–36, with the exception of articles 25, 27 (2) and (3), 31 (2), and 34, of the Port regulations for Singapore (*see* Appendix I), also apply to the Port of Dindings.

Note.—In article 35 (1) the night signal, a *green* light over a *red* light, does not apply to the Dindings.

Pangkor.—The village of Pangkor consists of a number of Malay and Chinese houses and a police station, with a school on the point about a quarter of a mile north-eastward of it.

Small craft may be safely grounded here for examination or slight repairs. Bathing is unsafe on account of crocodiles.

There is frequent communication by steamer with Penang. Steamers which ply between Penang and Perak river usually call at Pangkor.

DINDINGS RIVER.—Danger.—Buoy.—Beacons.—Dindings river, entered between Motts point and Mehegan point, has a deep and clear entrance, except for Lloyd rock (*Lat. 4° 15′ N., Long. 100° 35′ E.*) on the northern side, 3¾ cables westward of Motts point. From River passage, situated between the southern extremity of North bank and the northern end of East bank, there is a channel with a least width of 3 cables and a least depth of 19 feet (5^m8), extending to about 1½ miles above the anchorage off Lumut, and there are depths of over 5 fathoms (9^m1) in the fairway from the River passage bar to the anchorage, thence the channel varies in width from three-quarters of a cable to 3 cables, and is navigable for vessels of 18 feet (5^m5) draught as far as Sungei Rajah Hitam, about 10 miles from the entrance ; the narrowest part is at Ayer Tawar, about 4½ miles above Lumut.

A white obelisk stands on the coast about a quarter of a mile northward of Motts point, and another on Tanjong Batu on the northern side of the river about 2 miles east-south-eastward of Motts point.

Lloyd rock, a pinnacle with a depth of less than 6 feet (1^m8), is marked on its south-western side by a red conical buoy, surmounted by a ball.

Mehegan point is the termination of a spur from Bukit Pasir Anging, 278 feet (84^m7) high, situated 6 cables south-eastward. About 1¼ cables westward of the point are River rocks, about 12 feet (3^m7) high, lying within the 3-fathom (5^m5) line fringing the point.

Between Mehegan point and Lumut are Telok Perpat and Telok Haji Salim, which are fringed by a bank, which dries, extending 1¾ cables offshore in the latter bay.

Lumut.—Light.—Lumut, on the south bank of the Dindings river, about 2¼ miles eastward of Mehegan point, is the headquarters of the Administration.

There is frequent communication with Penang by steamers, calling at Pangkor.

Charts 1009, 793, 1355, 748b.

Chart 792.

There is a small pier with a **T**-head, with a least depth of 10 feet ($3^{m}0$) alongside and 20 feet ($6^{m}1$) at a distance of 15 feet ($4^{m}6$) from it. In 1945, a sandbank was reported to extend about 20 yards ($18^{m}3$) from the western end of the pier.

A light is exhibited from the head of the pier.

Bread, vegetables and fruit can be obtained.

There is a civil hospital.

In 1934, 1506 vessels aggregating 65,537 tons, entered and cleared the Dindings.

Anchorage.—Anchorage may be obtained, in depths of from 6 to 7 fathoms ($11^{m}0$ to $12^{m}8$), off Lumut pier.

In 1935, H.M.S. *Medway* moored in a position with the pier-head light bearing 208°, distant about 2 cables.

Prohibited anchorage.—Lights.—No vessel shall anchor within one cable of the telegraph cable, the line of which is marked by day by notice boards, marked with the word "Cable," and by night by two *red* lights in line on the southern shore, situated about 4 cables west-south-westward of the pier.

Directions.—A vessel approaching North entrance should steer for Bukit Pangkor (*Lat. 4° 14′ N., Long. 100° 34′ E.*), bearing not more than 145°, which will lead well clear of the south-western edge of North bank and midway between it and Pulau Tukun Terindak; when abeam of this islet she should steer to pass half a cable north-eastward of Offlying rocks, thence the best course appears to be to pass south-westward of Bower patch and northward of Michael patch, and between it and the white conical buoy, but there are no leading marks. When the sun is in a favourable position for showing up the shoals the eye is the best guide, but attention should be paid to the speed of the vessel and set of the tidal stream.

If bound for the anchorage off Sungei Pinang besar in Dindings channel, she should steer to pass about 2 cables eastward of Table rock, and thence preserving about the same distance from the island steer for the anchorage. If bound for Dindings river, after passing the white conical buoy, she should cross River passage bar with Pulau Tukun Terindok, bearing 291° astern, showing between North point and Offlying islet, which leads through the entrance to the river in mid-channel.

A vessel approaching South entrance, after passing Fairway rock, should alter course north-eastward and bring Tanjong Hantu, bearing 347°, just open eastward of Table rock, which will lead in mid-channel to the anchorage off Sungei Pinang besar, in Dindings channel. *See* view facing page 138.

If proceeding into Dindings river, she should continue northward from the anchorage, passing about 2 cables eastward of Table rock, thence midway between Pulau Pangkor and East bank and across the bar of River passage as directed for North entrance.

Tidal streams.—The south-going stream sets fairly through Dindings channel at a rate of from 2 to 3 knots at springs. In Dindings river, both the in-going and out-going streams have a rate of 2 knots at neaps and 3½ knots at springs.

South-westward of Pulau Pangkor the tidal streams set south-eastward and north-westward, and through the narrow passage between Pulau Pangkor Laut and Pulau Pangkor, at a rate of from 2 to 3½ knots at springs.

Charts 793, 794, 1355, 748b.

Chart 1009.

COAST.—From Tanjong Katak to the entrance to Perak river, about 12 miles south-eastward, the coast forms a deep bight, and is low, thickly wooded, and completely featureless. Denison lighthouse, situated 8½ miles south-eastward of Tanjong Katak, is the only object on this stretch of the coast which could possibly be identified by a stranger.

Off-lying islands.—Light.—Sembilan islands, of which Pulau Agas, the northernmost, lies 9½ miles westward of Denison lighthouse, are uninhabited, except for the small fishing village on Pulau Rumbia, and are remarkably steep-to.

Pulau Agas, 165 feet (50^{m}3) high, and wooded, has a large rock, 15 feet (4^{m}6) high, close off its south-western point. Pulau Payong, 141 feet (43^{m}0) high, and wooded, lies about 9 cables south-southwestward of Pulau Agas, with a smaller wooded islet, 75 feet (22^{m}9) high, between them. A rock, 14 feet (4^{m}3) high, lies about 1½ cables north-eastward of Pulau Payong; Rosa rock (*Lat. 4° 03′ N., Long. 100° 35′ E.*), a pinnacle with a depth of 11 feet (3^{m}4), lies about 7 cables south-eastward of the same island. Pulau Nipis, about 1¾ miles westward of Pulau Payong, is 250 feet (76^{m}2) high, and thickly wooded.

Pulau Rumbia, the largest and central island of the group, is 567 feet (172^{m}8) high and is thickly wooded. Good landing may be found in a number of small sandy bays, in one of which, situated close southward of the north-eastern point of the island, there are a few native huts. Pulau Lalang, half a mile southward of Pulau Rumbia, is in two portions which are joined together by a drying reef. The northern portion is 368 feet (112^{m}2) high, and the southern 299 feet (91^{m}1), and both are thickly wooded. At the south-eastern extremity there is a small isolated summit, 150 feet (45^{m}7) high, which is partially cleared. Good landing may be obtained on both sides of the island on sandy beaches.

Two islets, the southern of which is Pulau Saga, a wooded islet, 161 feet (49^{m}1) high, and the northern, 91 feet (29^{m}7) high, lie about one cable apart about half a mile westward of Pulau Lalang. Pulau Buluh, the southern island of the group, is 434 feet (132^{m}3) high, with a flat top, and is densely wooded. Black rock, 4 feet (1^{m}2) high, lies about 2 miles westward of the southern extremity of Pulau Rumbia. White rock, 65 feet (19^{m}8) high, lies one mile southward of Black rock.

A light is exhibited, at an elevation of 70 feet (21^{m}3), from an iron framework structure on a concrete base, 38 feet (11^{m}6) in height, on White rock.

Caution.—Vessels approaching from southward between the Sembilan islands and the mainland at night are warned to give Pulau Agas a wide berth, as the tidal streams around the islands are strong and irregular.

PERAK RIVER AND APPROACHES.—Lights.—Buoyage.—A light is exhibited, at an elevation of 38 feet (11^{m}6), from a white iron framework structure on piles from Denison lighthouse.

The entrance to Perak river is fronted by an extensive shallow mudbank, on which there are several patches which dry, extending some miles offshore, and which, in 1937, was reported to be extending northwestward about 3½ miles south-eastward of Tanjong Katak. There are two definite channels into the river across these banks. The

Charts 793, 1355, 748b.

Chart 1009.

northern channel runs in a more or less direct line from Denison lighthouse to the river entrance, and carries a least depth of 7 feet ($2^{m}1$). The other channel crosses the banks in a south-easterly direction, and has a least depth of 8 feet ($2^{m}4$), and is marked by a light-buoy, two black buoys and two red buoys.

The Bagan Datoh fairway light-buoy, exhibiting a *white flashing* light *every seven and a half seconds*, is moored at the entrance to the southern channel about 4 miles north-westward of Tanjong Bras Basah.

Pasang Api light (*Lat. 3° 59′ N., Long. 100° 46′ E.*) is exhibited, at an elevation of 53 feet ($16^{m}2$), from a white iron framework structure on a concrete base, about 2½ miles eastward of Tanjong Bras Basah, the southern entrance point of the river.

Caution.—It is reported that the depths in the channel are liable to change, and caution is therefore necessary; also, care must be taken to avoid the numerous fishing stakes which are erected near the borders of the channel. Vessels without local knowledge, with a draught of 10 feet ($3^{m}0$) or more should not attempt to enter by either channel.

Tidal streams.—At the entrance to Perak river the tidal streams attain a rate of about 2½ knots at springs, and 1½ knots at neaps, and turn at the time of high and low water at Bagan Datoh. The rates of the streams at Telok Anson are not appreciably greater normally, but they are liable to be largely affected by the rains.

Between Denison lighthouse and the entrance to the river the tidal streams set across the channel.

Pilots.—There are no regular pilots, but the Harbour master who resides at Telok Anson (page 146) will, on receipt of 24 hours' notice, send a reliable native to pilot the vessel.

Bagan Datoh.—Lights.—Bagan Datoh village is situated on the south bank of Perak river, about 4 miles eastward of Tanjong Bras Basah.

There is a concrete pier with a **T**-head, with a depth of 10 feet ($3^{m}0$) alongside, situated at Bagan Datoh. Close westward of the pier is a small tidal basin which dries.

A light is exhibited from a concrete pillar at the head of the pier at Bagan Datoh, and also from the flagstaff close to it; these lights in line with a white diamond-shaped beacon on the river bank lead through the channel on the northern side of the river.

Limited supplies of fresh provisions may be obtained in the village, but further quantities have to be procured from Telok Anson.

The principal export is copra.

There are no berthing facilities.

Anchorage.—Directions.—Anchorage may be obtained off the pier at Bagan Datoh, in a depth of about 3½ fathoms ($6^{m}4$), mud, about 2 cables from the southern shore.

Vessels should approach the northern channel with Denison lighthouse bearing 118°. Vessels coming from southward between the Sembilan islands and the mainland should not alter course on to this line of bearing until Pulau Nipis is open north-westward of Pulau Agas, bearing about 245°. They should pass about one cable westward of Denison lighthouse, and then they should alter course southward and steer about 157° for a distance of about 1½ miles, thence again alter course southward and steer about 175° for a distance of about 2½ miles;

Charts 793, 794, 1355, 748b.

Chart 1009.

when Tanjong Kupang is abeam they should round it and keep in mid-channel to the anchorage off the pier at Bagan Datoh. It is usually easy to see the edge of the banks on either side of the channel by day.

Bagan Datoh to Telok Anson.—Shoals.—Buoyage.—About 1¼ miles above Bagan Datoh there is an extensive middle ground, with a least depth of 5 feet ($1^{m}5$). Between Bagan Datoh and Telok Anson there are numerous unimportant villages. Anchorage may be obtained, in a depth of about 3 fathoms ($5^{m}5$), mud, about 2 cables from the right bank of the river at Kota Stia, about 6 miles above Bagan Datoh (*Lat. 4° 00′ N., Long. 100° 47′ E.*).

A light is exhibited at Kota Stia.

A shoal, with a depth of 17 feet ($5^{m}2$), lies about 2 cables south-westward of Tanjong Medan, situated on the left bank about 5 miles below Telok Anson. There is a small middle ground, with a least depth of 6 feet ($1^{m}8$), about 3½ cables north-eastward of Telok Menintam, situated on the left bank, about 1½ miles below Telok Anson; it is marked on its northern side by a buoy, painted in black and white chequers, surmounted by a black and white chequered cone. The shore bank on the western side of the river opposite Telok Anson extends about half way across.

Anchorages.—Directions.—Temporary anchorage may be obtained off Telok Anson, or off the railway pontoons, but vessels usually only anchor for short periods whilst waiting to go alongside.

The following directions are only intended to serve as a rough guide, as no vessel should attempt to enter the river without local knowledge.

In general, as is usual in most rivers, the greatest depths will be found in the bights or concave sides, and shoaler water off the points.

After passing Tanjong Kupang, a vessel should make for the southern side of the river, and should hug the left bank until past the middle ground shoal above Bagan Datoh, moving across to the opposite side before rounding the point opposite Kota Stia. Thence it is only necessary to follow the normal rule of river navigation, keeping well clear of the points, and hugging the concave side of bights. Particular care is necessary at Tanjong Medan, to close the left bank immediately after rounding the point, as the shoal water extends nearly half-way across the river from the opposite shore.

Vessels must keep to the right bank of the river whilst passing the middle ground off Tanjong Menintam.

Telok Anson.—Telok Anson is situated on the left bank of Perak river, about 30 miles from the entrance. The District officer and the heads of Government departments in the Lower Perak district reside here.

An overhead cable crosses the river at Telok Anson at a height of 42 feet ($12^{m}8$) above mean high water springs.

In 1939, 845 vessels of 296,726 tons entered the port.

The principal exports are tin and rubber.

Port regulations.—For Port regulations *see* Appendix II.

Piers.—About one mile below Telok Anson, on the left bank of the river, there are two railway pontoons at which coasting steamers are berthed. The depth alongside the northern pontoon is 20 feet ($6^{m}1$), and at the southern, 16 feet ($4^{m}9$).

Charts 793, 794, 1355, 748b.

Chart 1009.

About 4 cables southward of these pontoons is the Asiatic Petroleum Company's pier, with a T-head, 67 feet (20m4) long, with a least depth of 10 feet (3m0) alongside. Vessels with a draught of 14 feet (4m3) are reported to use this pier. The Standard Oil Company's pier is situated about 3 cables above the railway pontoons; it has a depth of 21 feet (6m4) alongside. The Harbour master's jetty, which has a depth of 18 feet (5m5) alongside, is at Telok Anson (*Lat. 4° 01′ N., Long. 100° 54′ E.*).

Communication.—There is frequent communication by steamer with Singapore and Penang.

Harbour facilities.—Fuel oil can be obtained. Fresh provisions are plentiful. Water is laid on to the piers. Ice may be obtained.

Chart 1355.

Sungei Kinta.—Sungei Kinta is a tributary of Perak river, about 5 miles above Telok Anson. Commander Singleton remarks:—"Returning on the 6th January, 1875, from service with the Naval Brigade at Kinta, the river was found to be greatly swollen from the few previous days' rain, and the sandbanks, which there had been great difficulty in passing when going up, had then sufficient water to allow of boats going over them. The British residency on the island off Bander Bharu (in Perak river a few miles above Durien Sabatang) was entirely flooded, and the guns landed were entirely under water. The river, which had risen at least 20 feet (6m1), fell suddenly about the 10th January, and owing to the shifting bottom (fine sand) the entire course was altered. The current on this occasion ran at the rate of 5 or 6 knots."

Charts 793, 794.

OUTLYING ISLAND.—Pulau Jarak is a densely wooded, precipitous island, 508 feet (154m8) high, lying about 24 miles westward of White rock, Sembilan islands; it is steep-to, except on the north-eastern side, from which boulders, some above water, extend nearly one cable.

Tidal streams.—The tidal streams set south-eastward and north-westward, at a rate of about 1½ knots, in the vicinity of Pulau Jarak. Tide-rips have been observed eastward of the island.

Chart 793.

Directions.—During the North-east monsoon, northerly and north-easterly winds frequently blow strongly between Pulau Jarak and the islands at the northern end of Malacca strait.

Chart 794.

A vessel bound south-eastward should pass between Pulau Jarak and the Sembilan islands, for the current often sets strongly north-westward in the middle of the strait; thence she should shape course to pass between One-fathom bank and the Aroeah (Aroa) eilanden, and, if at night, should sight Pulau Djemoer (Jemur) light.

For continuation of directions south-eastward, *see* page 166.

Charts 793, 794.

COAST.—**Light.**—Kuala Bernam, entered about 11½ miles south-south-eastward of Tanjong Bras Basah, is fringed by a mudbank with depths of from 3 to 18 feet (0m9 to 5m5), which extends about 3 miles offshore; there is a depth of 4 feet (1m2) in the approach. The river is navigable for steam launches for about 100 miles. Only small craft

Charts 793, 794.

with local knowledge should attempt to enter. The tidal streams are strong.

There is a small jetty in the river, off which vessels usually anchor. Sungei Bernam is the boundary between the States of Perak and Selangor.

A light (*Lat. 3° 50′ N., Long. 100° 48′ E.*) is exhibited, at an elevation of 25 feet (7m6), from a white tower on the northern point of the entrance to Kuala Bernam.

There is a tower on the southern bank about 7 miles within the entrance. There is a pier at Sabak, about 20 miles up the river, with a depth of about 16 feet (4m9) alongside.

Directions.—A vessel approaching Kuala Bernam should steer for the lighthouse, which shows clearly against the dark green trees behind it, bearing about 055°.

The bends of the river should be followed, avoiding the points. The greatest depths are almost invariably close in to where the nipa palms grow and shoalest where there are mangroves.

Chart 794.

Coast.—Between Kuala Bernam and Kuala Selangor, about 39 miles south-eastward, the coast is low and covered with jungle; the mud banks fringing it extend less than half a mile off until within 5 miles of Kuala Selangor, where it extends 1½ miles, but about midway between the mouths of the two rivers flats of sand and mud, with depths of less than 6 fathoms (11m0), extend about 8 miles offshore; a 5-fathom (9m1) patch lies just within the 10-fathom (18m3) line about 22 miles north-westward off Selangor lighthouse.

Fishing stakes.—Enclosures for capturing fish, 30 or 40 yards (27m4 or 36m6) square, consisting of bamboo, strengthened by cross poles, and having a solid platform well above the water, are situated off and along the coast, a few miles apart. They are generally in depths of about 5 fathoms (9m1), rarely in less, and are therefore useful in defining the shallow water. There are numerous stakes about 4 miles offshore with the entrance to the river bearing 055°.

Chart 3766.

Selangor river.—Light.—Depths.—The depth at the entrance to this river is 1½ feet (0m5), the channel of approach being marked by fishing stakes, which are frequently shifted, and by small tripods surmounted by baskets. The depths within the entrance are from 1½ to 2¾ fathoms (2m7 to 5m0), but the anchorage is indifferent, the holding ground being of soft mud, and the tidal streams strong.

The river is usually navigable for steam vessels of 8 feet (2m4) draught, for 14 miles, or as far as Kampong Siam, but there is little room to swing there; the bottom is soft mud. There is no danger in the river for a vessel of that draught, except a mudbank with a depth of 3 feet (0m9), and which has deep water close to the shore on either side of it, about 3 or 4 miles from the entrance, off Telok Penyamun. Above Kampong Siam there are several sandbanks, but the river is navigable by small craft, a further distance of 55 miles. The river is tortuous in its course, the banks are low throughout, and lined with attap and mangrove trees, and the greatest depths are found on the concave side.

A light (*Lat. 3° 20′ N., Long. 101° 15′ E.*) is exhibited, at an elevation of 238 feet (72m5), from a white cylindrical iron tower on a masonry

Charts 1355, 748b.

Chart 3766.

base, 90 feet (27^m4) in height, on Bukit Selangor, on the southern side of the entrance.

Directions.—Vessels should approach Kuala Selangor with the lighthouse bearing 061°, which will lead to the entrance of the channel.

Kuala Selangor.—Beacon.—Kuala Selangor, the settlement at the entrance, may be identified by the lighthouse, the rain catchment for the reservoir, and the official bungalows and rest-house, all of which are situated on Bukit Selangor which is partially wooded. The native settlement and Government offices are situated at the foot of this hill, about 3 cables within the entrance to the river.

The southern entrance point is marked by an old light-tower and a white conical iron beacon, surmounted by a ball.

On the northern side, within the entrance, is a Malay and Chinese settlement, and a factory.

A small pier, with a depth of 2 feet (0^m6) alongside, extends from the shore at this point.

The settlement is connected to the general railway system.

Tidal streams.—The flood stream in the river runs for 5 hours, the ebb for 7 hours, sometimes attaining a rate of 5 knots.

Trade.—The principal exports are tin, guttapercha, ivory, bark, hides, salt fish, and rattans; the chief imports are rice, salt, opium, tobacco, tea, and oil.

Charts 3766, 3453.

Coast.—From Kuala Selangor to abreast of the northern end of Pulau Klang, about 18 miles southward, the coast is low, densely wooded, and flooded in most parts at high water; it is fringed by a mudbank, which dries, extending about one mile offshore, gradually closing the coast at the southern end.

Bukit Jeram, 216 feet (65^m8) high, is a prominent hill lying close to the coast and 6½ miles south-south-eastward of Kuala Selangor lighthouse. On its summit is a meteorological station, consisting of a small building with a white roof, and a staff with a black ball and triangle at the northern end (*Lat. 3° 15′ N., Long. 101° 18′ E.*).

For islets and dangers lying within the 3-fathom (5^m5) line off this coast, *see* page 151.

Meteorological table.—*See* page 38.

Chart 3453.

KLANG STRAIT.—Depths.—Klang strait, between Pulau Klang and Pulau Che Mat Zin, on the west, and Pulau Lumut with the mainland, on the east, is divided into two parts, North Klang strait and South Klang strait; it presents no great difficulties for vessels of moderate or even fairly deep draught.

In the northern approach to North Klang strait there is a least depth of 5 fathoms (9^m1) in the fairway and there is not less in the strait until reaching the dredged channel at the southern end (page 152) where there is 25 feet (7^m6) on the leading line.

At the southern entrance to South Klang strait there is a least depth of 23 feet (7^m0) on the leading line over the bar, thence there is a least depth of 8 fathoms (14^m6) in the fairway as far as its junction with the southern end of North Klang strait, whence a depth of 25 feet (7^m6) can be carried to Port Swettenham.

Tidal streams.—Tidal streams run everywhere with considerable

Chart 3453.

strength, but do not exceed, as a general rule, 3 knots, the maximum rate being attained about 2 hours before high and low water. They generally set parallel to the shore in both straits, but care must be taken, when passing the various creeks and channels, that the vessel be not set into or from them. This is especially the case off Tanjong Mahang (Che Mat Zin), the southern extremity of Pulau Che Mat Zin (page 151).

Off Pulau Pintu Gedong light-structure the north-going stream makes 2½ hours after high water at Port Swettenham; at springs the south-going stream makes 3 hours before, and at neaps 3½ hours before high water at Port Swettenham; there is a period of slack water for three-quarters of an hour at springs, and for one hour at neaps.

Southward of Tanjong Sarang Lang (*Lat. 3° 00′ N., Long. 101° 20′ E.*) at springs the north-going stream makes about 4 hours after, and at neaps 3½ hours after high water at Port Swettenham; at springs and neaps the south-going stream makes 2½ hours before high water at Port Swettenham; there is a period of slack water for 25 minutes at springs, and 40 minutes at neaps.

In North Klang strait at springs the north-going stream makes 2¼ hours after, and at neaps 2¾ hours after high water at Port Swettenham; at springs the south-going stream makes 4¼ hours before, and at neaps 4 hours before high water at Port Swettenham; there is a period of slack water for about one hour.

Off Pulau Angsa at springs the north-going stream makes 1¾ hours after, and at neaps 1¼ hours after high water at Port Swettenham; at springs the south-going stream makes 5¼ hours before, and at neaps 4¾ hours before high water at Port Swettenham; there is a period of slack water for about one hour at springs and about 1½ hours at neaps.

Chart 3766.

At 5 miles south-westward of the entrance to Selangor river the north-west-going stream makes from 1½ to 2 hours after high water on the shore, and attains its greatest rate of about 1½ knots at 5½ hours after high water. The south-east-going stream makes at 4½ hours before high water on the shore, and attains its greatest rate of about 2 knots at 2 hours before high water.

Chart 3453.

Pilots.—There are several licensed pilots at Port Swettenham who meet vessels, when ordered, at any desired stage between the north-western end of Angsa bank, in the northern approach to the port, and seaward of the outer light-buoy about 2 miles southward of Pulau Pintu Gedong light-structure, in the southern approach. Pilotage is not compulsory.

Except in cases of emergency, the pilots are forbidden to board vessels between the two light-buoys off Pintu Gedong light-structure.

Klang islands.—Klang islands are formed of black mud, and are densely wooded with mangrove trees and bushes, being in most parts swampy at high water. The creeks and channels which separate and intersect them are tortuous, and not much used except by native small craft; they abound with crocodiles.

There are extensive mudbanks westward of this group of islands, while new islands are being formed and the present ones extending in all directions.

Pulau Klang forms the western side of North Klang strait, which has a least width of about one mile.

Chart 3453.

Pulau Che Mat Zin, south-westward of Pulau Klang, from which it is separated by a narrow channel, forms the western side of South Klang strait, and westward of Pulau Klang and Pulau Che Mat Zin are Pulau Ketam, with a Custom-house and police station, which has a red roof, at the largest village, Pulau Tengah, Pulau Selat Kering, and Pulau Pintu Gedong, the southernmost of the group, with a light-structure (page 154) at its south-eastern extremity.

Pulau Lumut forms the eastern side of South Klang strait; between its north-western extremity and Tanjong Sarang Lang (*Lat. 3° 00′ N., Long. 101° 20′ E.*), the south-eastern point of Pulau Klang, the strait is 4 cables wide between the 5-fathom ($9^{m}1$) lines.

Charts 3766, 3453.

NORTHERN APPROACH TO KLANG STRAIT.—Islets and dangers.—Lights.—Beacon.—Light-buoy.—The northern approach is bounded on the west by Angsa bank, which, within a depth of 5 fathoms ($9^{m}1$), extends 25 miles north-westward from Pulau Klang, and on the east by the extensive mudbank, with rocks above water in places, fronting the coast southward of Kuala Selangor. Discoloured water marks the edges of these banks.

Fishing stakes extend into deep water on either side of the strait, and are continually being shifted, but are generally within the 3-fathom ($5^{m}5$) line; they are mostly of bamboos; the platforms from which the nets are suspended are always above high water, being marked by tall bamboos and small flags.

Fishing boats are constantly seen on Angsa bank, which is one of the most important fishing grounds in the vicinity; they also at times frequent the northern approach to Klang strait, and lay their drift nets right across the channel. These nets are marked by wooden floats and have a boat at each end of the net.

Angsa bank, of mud and sand, dries in parts, the centre uncovering at about half-ebb. On its eastern edge, about 9 miles north-westward of the north-western extremity of Pulau Klang, is Pulau Angsa, and close southward of it Pulau Selatan, wooded islets, 91 and 92 feet ($27^{m}7$ and $28^{m}0$) high, respectively.

A light is exhibited, at an elevation of 117 feet ($35^{m}7$), from a white circular tower, 35 feet ($10^{m}7$) in height, on Pulau Angsa.

A light-buoy, painted red, exhibiting a *white flashing* light *every five seconds*, is moored about 16 miles north-westward of Pulau Angsa.

A Government rest-house and pier, in conjunction with the light-keeper's quarters, is situated in the bight on the eastern side of Pulau Angsa; landing is easily affected at all times. These islets are uninhabited except by the light-keepers.

Westward of Angsa bank are the North sands, which are described on page 165.

Batu Penyu or Glamorganshire rock, with a depth of 2¼ fathoms ($4^{m}1$), and steep-to, lies in the fairway, about 2½ miles northward of Pulau Angsa.

A light is exhibited, at an elevation of 20 feet ($6^{m}1$), from an iron framework structure on a concrete base on Batu Penyu.

On the eastern side of the channel is a group of four islets lying within the 3-fathom ($5^{m}5$) line, consisting of Pulau Besar, the largest, 75 feet ($22^{m}9$) high, situated about 4 miles eastward of Batu Penyu;

Charts 794, 1355, 748b.

Charts 3766, 3453.

Pulau Anak Angsa, 15 feet ($4^{m}6$) high, with a solitary tree on it, close northward of Pulau Besar; Pulau Jemor, 34 feet ($10^{m}4$) high, and Pulau Tekukor, 63 feet ($19^{m}2$) high, half a mile south-south-eastward, and 1¼ miles south-south-westward, respectively, of Pulau Besar (*Lat. 3° 13′ N., Long. 101° 17′ E.*).

These islets are usually easily identified, being of a reddish colour, and covered with shrub; interspersed among them are several rocks and shoals, the whole being fronted by a shallow mudbank, which breaks occasionally at low water. This area should be avoided.

Batu Mandi, 3 miles eastward of Pulau Angsa, dries 9 feet ($2^{m}7$), and is marked by a white cylindrical masonry beacon, surmounted by a staff and ball, 18 feet ($5^{m}5$) in height.

Anchorage.—Anchorage may be obtained anywhere in the northern approach to Klang strait, in convenient depths over mud and sand. A good berth is in a depth of 12 fathoms ($21^{m}9$), mud, with Pulau Angsa bearing 275°, distant 3 cables.

Charts 2153, 3453.

NORTH KLANG STRAIT.—Lights.—Beacons.—Dangers.—Light-buoys.—A conical light-buoy, painted red, exhibiting a *white flashing* light *every five seconds*, is moored on the western side of the fairway, 4 miles south-eastward of Pulau Angsa.

A spit of sand and mud, which dries from one to 7 feet ($0^{m}3$ to $2^{m}1$), extends nearly 1¼ miles north-westward from the northern extremity of Pulau Klang and is prolonged, with depths of less than 3 fathoms ($5^{m}5$), for a further mile in the same direction.

A conical light-buoy, painted white, exhibiting a *red flashing* light *every five seconds*, is moored on the eastern side of the fairway off the entrance to Sungei Serdang besar, about 2¼ miles northward of Tanjong Bakau, the north-eastern extremity of Pulau Klang.

A conical light-buoy, painted white, exhibiting a *white flashing* light *every ten seconds*, is moored about half a mile northward of Tanjong Bakau.

A light is exhibited from a beacon at the entrance to Sungei Dua besar, situated on the mainland, 1¾ miles south-eastward of Tanjong Bakau.

A bank, with depths of from one to 18 feet ($0^{m}3$ to $5^{m}5$), extends 2 miles northward from Tanjong Sarang Lang, nearly parallel with, and close to, the eastern side of Pulau Klang. It is marked on its eastern side, about 9 cables from its northern end, by a conical light-buoy, painted red, exhibiting a *white flashing* light *every five seconds*.

A bank, with depths of less than 3 fathoms ($5^{m}5$), lies with its northern extremity 4½ cables northward of the northern extremity of Pulau Lumut. Between this bank and the mainland eastward of it is a bar, through which there is a channel, dredged, in 1935, to a depth of 26 feet ($7^{m}9$), leading to Port Swettenham.

A light-buoy, painted red, exhibiting a *red flashing* light *every five seconds*, is moored on the western side of the dredged channel, 6 cables northward of the northern extremity of Pulau Lumut.

Two leading lights are situated about 2 cables eastward of the entrance to Sungei Labohan Gurap, on the northern side of Pulau Lumut, and in line lead through the dredged channel mentioned above. The front light is exhibited, at an elevation of 15 feet ($4^{m}6$), from a

Charts 3766, 794, 1355, 748b.

Charts 2153, 3453.

concrete structure, surmounted by a diamond, painted in red and white stripes; the rear light is exhibited, at an elevation of 35 feet (10^{m}7), from a wooden pile beacon, surmounted by a disc.

About one mile westward of these beacons are two beacons carrying similar shapes to those described above, the front beacon being painted in red and white stripes, and the rear beacon in black and white stripes; these beacons, in line, bearing 182°, lead eastward of the bank extending northward from Tanjong Sarang Lang in a least depth of 3 fathoms (5^{m}5). They are of great use to vessels as a clearing mark leaving Port Swettenham and proceeding through South Klang strait, as at low water they find it difficult to turn without getting very close to the bank extending northward from Tanjong Sarang Lang.

Two wooden pile beacons surmounted by a white disc, marked "Port Limit," are situated one on either side of North Klang strait, about 1¼ miles northward of Tanjong Sarang Lang and Tanjong Gila, the northern entrance point of Port Swettenham, respectively.

A light (*Lat. 3° 00′ N., Long. 101° 20′ E.*) is exhibited, at an elevation of 80 feet (24^{m}4), from a white iron framework tower, 82 feet (25^{m}0) in height, surmounted by a signal yard, on Tanjong Sarang Lang.

Signal station.—A signal station, painted white with a galvanised iron roof which is a conspicuous mark, is situated on the southern side of the entrance to Sungei Semantan, 5¼ miles northward of Tanjong Gila, and is connected by telephone with the Harbour master's office at Port Swettenham.

Tide-gauge.—A tide-gauge is fitted to the front beacon of the pair situated eastward of Sungei Labohan Gurap. The figures are 6 inches (0^{m}15) in height, the top of the figure indicating the depth above the chart datum.

Anchorage.—Directions.—Good anchorage may be obtained, in a depth of 10 fathoms (18^{m}3), mud, with ample swinging room, about 6 cables north-eastward of Tanjong Sarang Lang.

Charts 3766, 3453.

A vessel approaching North Klang strait from northward, should be guided by the soundings; the bottom is soft and not likely to damage any vessel touching, and the water is invariably smooth.

From a position about 14 miles westward of Selangor lighthouse, a vessel should steer south-eastward into the strait; on sighting Pulau Angsa she should steer for it, bearing 154°, until about 3½ miles from it; Bukit Jugra, situated 11 miles south-south-eastward of Tanjong Sarang Lang, bearing 150°, and just open north-eastward of Pulau Angsa, will lead thence between Angsa bank and Batu Penyu light-structure.

Chart 3453.

Thence she should steer about 138° until the light-beacon at the entrance to Sungei Dua besar is sighted, when she should keep it on that bearing. She should not bring Pulau Angsa to bear more than 312° until she is abeam of the light-buoy about half a mile northward of Tanjong Bakau.

Charts 2153, 3453.

After passing the light-buoy she should continue to steer for the light-beacon at the entrance to Sungei Dua besar until the leading beacons on the northern side of Pulau Lumut, situated about 7½ cables west-south-

Charts 2153, 3453.

westward of Sungei Labohan Gurap, are in line, bearing 182°, when she should alter course southward and steer for the Labohan Gurap front leading light-structure, bearing 169°, for a distance of 1¾ miles, thence alter course southward to bring these leading light-structures in line, bearing about 164°, and thence she should keep on this alignment through the dredged channel.

If proceeding direct through South Klang strait, when the Labohan Gurap leading light-beacons come into line she should continue to steer with the rear beacon of the pair 7½ cables west-south-westward of the entrance to Labohan Gurap well open eastward of the front beacon to avoid the bank extending northward from Tanjong Sarang Lang (*Lat. 3° 00′ N., Long. 101° 20′ E.*) ; this course will lead to the northern entrance to South Klang strait.

For directions for South Klang strait, *see* page 155.

Chart 3453.

SOUTH KLANG STRAIT.—Dangers.—Buoyage.—Lights.—Beacons.—On the eastern side of the entrance to South Klang strait, a mudflat, with depths of less than 3 fathoms ($5^{m}5$), and parts of which dry, extends about 8 cables from the coast southward of Tanjong Selat Lumut, the southern entrance point of Kuala Selat Lumut, which separates Pulau Lumut from the mainland.

A mudflat, with depths of less than 3 fathoms ($5^{m}5$), extends one mile south-westward from Tanjong Buas Buas, the south-western point of Pulau Lumut. A 3-fathom ($5^{m}5$) patch lies 8½ cables westward of the point, and 3¾ cables eastward of the leading line over the bar. A spit, with depths of from one to 2¾ fathoms ($1^{m}8$ to $5^{m}0$), extends about 8 cables north-north-westward from Tanjong Buas Buas, the outer end lying about 2¾ cables from the eastern shore of the strait.

A can light-buoy, painted white, exhibiting a *red flashing* light, showing a *one-and-a-half-second* flash *every seven seconds*, is moored on the western side of the leading line over the bar at the entrance to South Klang strait, and a conical light-buoy, painted red, exhibiting a *white flashing* light *every five seconds*, is moored close to the south-eastern side of the leading line about 4 cables south-south-eastward of Pintu Gedong light-structure, and marks the turning point into the strait.

A light is exhibited, at an elevation of 60 feet ($18^{m}3$), from an iron structure on piles, the upper part white and the lower part black, on Pintu Gedong, close off the southern side of Pulau Pintu Gedong.

A white beacon is situated on the southern side of Pulau Pintu Gedong, about 1½ cables northward of Pintu Gedong light-structure ; it is of less elevation than the light-structure ; in line they lead across the bar.

A bank, with depths of less than 3 fathoms ($5^{m}5$), extends about half a mile southward from the southern extremity of Pulau Pintu Gedong, and about 2½ cables south-eastward from the south-eastern point.

A spit, with a depth of 1½ fathoms ($2^{m}7$) over its outer end, extends a quarter of a mile south-south-westward from Tanjong Mahang (Che Mat Zin).

A light is exhibited, at an elevation of 15 feet ($4^{m}6$), from a white concrete pile beacon, surmounted by a disc, and marked " First point "

Charts 3766, 794, 1355, 748b.

Chart 3453.

in black letters, situated on First point, on the south-eastern side of Pulau Che Mat Zin, about one mile north-eastward of Tanjong Mahang.

A beacon, 16 feet ($4^{m}9$) high, painted in black and white stripes and surmounted by a disc, stands on the eastern shore of the strait, about 2¾ miles north-north-eastward of Tanjong Buas.

Mudflats, which dry, connect the northern end of Pulau Che Mat Zin with Tanjong Sarang Lang, and are marked on their eastern edge by two beacons similar to that situated close to First point, mentioned above, 20 and 15 feet ($6^{m}1$ and $4^{m}6$) high, respectively.

A light (*Lat. 2° 58′ N., Long. 101° 19′ E.*) is exhibited, at an elevation of 15 feet ($4^{m}6$), from a beacon, surmounted by a diamond, marked "Second point" in black letters, situated close south-westward of Second point, on the north-western side of Pulau Lumut, 2¾ miles south-westward of the northern extremity of the island.

About one mile north-eastward of Second point is the entrance to Sungei Chandong (Chondong) besar, which is fronted by a bank, with depths of from one foot to 3 fathoms ($0^{m}3$ to $5^{m}5$), extending half a mile north-eastward and 1½ cables offshore; the bank is marked at its outer edge by a red conical buoy surmounted by a ball, situated about 3½ cables northward of the northern entrance point of Sungei Chandong besar.

Chart 2153.

A wooden pile beacon surmounted by a white disc marked "Port Limit," is situated on the north-western side of Pulau Lumut, 8½ cables south-westward of the northern extremity of the island.

The leading beacons situated about 2½ cables north-eastward of the Port Limit beacon, are described on page 153.

Signal station.—Signals.—There is a signal station close eastward of Tanjong Ru, situated on the south-eastern side of the entrance to South Klang strait about 4½ miles south-eastward of Pintu Gedong light-structure. Vessels bound for Port Swettenham through South Klang strait are requested to display their National colours and House flags when passing the signal station, which will answer by displaying the House flag above the answering pendant of the International Code of Signals; if the House flag is not in the possession of the signal station, the answering pendant only will be displayed. The vessel will be reported by telephone to the signal station at Port Swettenham where the signal will be repeated for the information of the vessel's agents.

Directions.—A vessel approaching the entrance to South Klang strait from southward should keep Pintu Gedong light-structure in line with the white beacon northward of it, bearing 000°, which will lead across the bar in a least depth of 25 feet ($7^{m}6$), passing eastward of the white can light-buoy. When the black and white beacon on the eastern side of the strait bears 050° she should steer for it on that bearing, passing close north-westward of the light-buoy moored about 4 cables south-south-eastward of Pintu Gedong light-structure, and when nearing Tanjong Mahang haul out south-eastward and keep in mid-channel.

The black and white beacon on Pulau Lumut kept open south-eastward of the south-eastern extremity of Pulau Che Mat Zin, will clear the bank extending south-eastward from the south-eastern point of Pulau Pintu Gedong, towards which the north-going stream sets strongly.

Charts 794, 1355, 748b.

Chart 2153.

Above Pintu Gedong light-structure no difficulty should be experienced in navigating the strait, as the shores are fairly steep-to, and the tidal streams run fairly through, but the indraught or outset from the channel between Pulau Che Mat Zin and Pulau Pintu Gedong and that between Pulau Che Mat Zin and Pulau Klang should be guarded against.

PORT SWETTENHAM. — Depths. — Lights. — Beacons. — Between Tanjong Gila (*Lat. 3° 00′ N., Long. 101° 22′ E.*) and Tanjong Sungei Agas, the western entrance point of Klang river, about 1½ miles eastward, a bank, with depths of less than 3 fathoms ($5^{m}5$), extends to a maximum distance of 2½ cables from the northern shore; between its outer edge and the southern shore there are depths of over 3 fathoms ($5^{m}5$) over a least width of 2½ cables, and depths of not less than 5 fathoms ($9^{m}1$) over a least width of about 1½ cables.

Two leading lights are situated at Port Swettenham, which, in line, lead to the anchorage off the town. The front light is exhibited, at an elevation of 30 feet ($9^{m}1$), from a white flagstaff, 85 feet ($25^{m}9$) in height, close to the root of the Customs pier; the rear light is exhibited, at an elevation of 40 feet ($12^{m}2$), from a white beacon with a black stripe, surmounted by a red disc, 40 feet ($12^{m}2$) in height.

A light is exhibited, at an elevation of 18 feet ($5^{m}5$), from a brown hut, on the head of the Railway passenger jetty.

A white beacon, surmounted by a diamond, stands on the railway water tank, situated about 1½ cables northward of the Railway passenger jetty. A beacon stands on the northern shore about 6 cables eastward of Tanjong Gila.

There are 8 pairs of beacons on the southern side of the harbour, situated between Tanjong Balei and a position about 14 cables westward; the alignment of each pair indicates the position of the berths Nos. 1 to 8 from east to west.

Two leading lights are situated on the northern side of the entrance to Sungei Aur, about 6 cables southward of the Railway passenger jetty, and in line, bearing 136°, lead north-eastward of the bank extending from Tanjong Balei. The front light is exhibited from a beacon consisting of a white triangle on a column on the southern end of No. 6 wharf, and the rear light from a similar beacon with a white disc in the middle of No. 7 wharf. These lights are exhibited only when a vessel is approaching or leaving No. 6 wharf.

Signal station.—There is a signal station and flagstaff at the root of the Customs pier, situated about three-quarters of a cable south-eastward of the Railway passenger jetty.

Mooring buoys.—Seven mooring buoys, Nos. 1 to 3 and 5 to 8 are situated in the fairway of the approach to the Railway passenger jetty; there are several others on the northern side of the harbour, and some close north-westward of the same jetty. The positions of these buoys may be seen on the chart.

Anchorage.—Directions.—Vessels may anchor as convenient off the town provided they do not obstruct the approach to the piers. Should the mooring buoys be occupied, deep draught vessels may anchor in a suitable depth westward of No. 8 buoy.

After rounding Tanjong Gila (*Lat. 3° 00′ N., Long. 101° 22′ E.*), vessels should keep towards the southern shore to avoid the bank

Charts 3453, 794, 1355, 748b.

Chart 2153.

extending from the northern shore, and not get northward of the leading line.

Port limits.—The limits of the port of Port Swettenham are defined approximately as follows :—

From a beacon on the south bank of Sungei Aur in a straight line to a beacon on Tanjong Balei, thence along the northern coast of Pulau Lumut to a beacon on the north-western side of Pulau Lumut, situated 6 cables southward of Tanjong Sarang Lang lighthouse, thence in a straight line to a beacon on the eastern side of Pulau Klang, situated 12 cables northward of Tanjong Sarang Lang lighthouse, thence in a straight line eastward to a beacon on the mainland, thence along the coast southward and eastward to Tanjong Sungei Agas, thence along the western bank of Klang river to a beacon about 4 cables northward, thence in a straight line to a beacon on the opposite shore, thence to the point of commencement, including all piers, jetties, landing places, wharves, quays, docks, and other similar works.

Port regulations.—The following regulations have effect within the limits of Port Swettenham :—

1. No vessel shall anchor, except with the express permission of the Harbour master, within an area enclosed by lines joining the following points :—

From the flagstaff of the signal station along the shore southward to the southern extremity of No. 7 wharf ; thence 270° for 975 feet ($297^{m}2$) ; thence 348° for about 3,250 feet ($990^{m}6$) to a point on the alignment of the beacon and the flagstaff, bearing 080½°, thence to the flagstaff (*Lat. 3° 00′ N., Long. 101° 24′ E.*).

The western boundary is indicated by transit beacons erected on the mainland about 5¼ cables south-south-eastward of Tanjong Balei ; the beacons, in line, bear 168½°. All vessels anchoring in the vicinity of these boundaries shall so moor as to swing clear of this area at all states of the tide.

2. All junks of whatever size and all other small craft not exceeding 45 tons, exclusive of steam and motor launches and sailing vessels used exclusively for pleasure, shall anchor only in an area enclosed by lines adjoining the following positions :—

   (a) A beacon, consisting of a white post surmounted by a white diamond, on Tanjong Sungei Agas.
   (b) A position 1,200 feet ($365^{m}8$), 225°, from (a).
   (c) A position 2,900 feet ($883^{m}9$), 270°, from (b).
   (d) A position on the coast 850 feet ($259^{m}1$), 000°, from (c).

Such craft shall not anchor elsewhere in the harbour except through stress of weather or circumstances beyond the control of the Master, except in the case of launches and yachts which, by permission of the Harbour master, may berth in the area defined by Rule 10. The southern boundary of the area is indicated by two beacons, surmounted by white triangles, situated about 1½ cables north-westward of the flagstaff of the signal station at Port Swettenham ; these beacons, in line, bear 090°.

3. No vessel or small craft shall anchor in the fairway of the mouth of the Klang river.

4. The speed of all vessels entering and leaving Port Swettenham is not to exceed 6 knots and is only to be increased in case of danger or when manœuvring near the wharves. When entering the port,

Charts 3453, 794, 1355, 748b.

Chart 2153.

speed shall be reduced to 6 knots or less at a distance of 1,000 yards ($914^{m}4$) from the first vessel at anchor or at a buoy; when leaving the port, speed may be increased after passing the last vessel at anchor or at a buoy.

5. No vessel shall proceed either to the Railway passenger jetty (*Lat. 3° 00′ N., Long. 101° 24′ E.*) or to a wharf unless signalled to do so by the Harbour master.

6. Steam vessels clearing from the port shall go beyond the western limit of the port before anchoring again.

7. When two vessels are approaching the port, the one by the North, and the other by the South Klang strait, so that both may arrive off Tanjong Gila at the same time, the vessel stemming the tide shall give way to the vessel with the following tide, and allow her to enter the port first.

The vessel so giving way shall indicate her intention by sounding on her whistle the Morse letter "R," i.e. - — - (short, long, short).

8. One long blast on whistle or siren calls the mooring boat. Three long blasts calls the mooring boat and the pilot. Four short blasts from a deep draught vessel indicates that she is unable to give way to one of lighter draught. Five long blasts from a vessel is the signal for a tug.

9. The quarantine anchorage shall be within the port limits westward of the meridian 101° 22′ 40″.

10. The area enclosed by lines joining the following points shall be used for moorings for launches, yachts and other craft only, subject to the Harbour master's permission:—

(a) A beacon on the Railway passenger jetty.
(b) A point 800 feet ($243^{m}8$), 243°, from (a).
(c) A point 900 feet ($274^{m}3$), 327°, from (b).
(d) A beacon on the foreshore situated about 1,000 feet ($304^{m}8$) north-westward of the Railway passenger jetty.

No vessel shall use this area as a thoroughfare to or from Klang river; all vessels entering or leaving the river shall pass westward of the white buoy placed to mark the north-western corner of the area.

For general regulations for the ports of the Federated Malay States, *see* Appendix II.

Tidal streams.—The tidal streams attain a rate of from 2½ to 3 knots at springs, the east and south-going stream being stronger than the west and north-going stream. They attain their maximum rate about two hours before high and low water by the shore. Off the Railway passenger jetty at springs the east-going stream ends 1½ hours after, and at neaps 1¼ hours after high water by the shore; at springs and neaps the west-going stream ends 5¼ hours before high water by the shore; there is a period of slack water for about 10 minutes both at springs and neaps.

At the anchorage the east-going stream ends about a quarter of an hour later, and the west-going stream about three-quarters of an hour earlier than off the Railway passenger jetty (*Lat. 3° 00′ N., Long. 101° 24′ E.*).

When Klang river is full, after heavy rains, the streams become very confused, especially for about 2 hours after the commencement of the east-going stream.

Tidal stream signals.—The direction of the tidal stream at the

Charts 3453, 794, 1355, 748b.

wharves at Port Swettenham is denoted by a white ball at the signal station, at the southern yard-arm for the flood stream, at the northern yard-arm for the ebb stream, and in the centre for slack water; the stream at No. 1 buoy, where the ocean steamers lie, changes a little later, and captains of vessels when going alongside the wharves should be guided by the signals.

Town.—The town of Port Swettenham, situated on the eastern side of the entrance to Klang river, contains the Harbour master's office and other Government buildings. The buildings inshore of the railway line are hidden by trees. It is the terminus of the railway from Klang. The estimated population of Port Swettenham, in 1939, was 12,220.

Wharves.—The following wharves and piers, alongside which vessels can lie in any weather, are situated off the town of Port Swettenham, and from north to south are:—

A wooden jetty, known as the A.P.C. pier, with a depth of 23 feet (7^{m}0) alongside, situated 5½ cables northward of the flagstaff of the signal station.

Railway passenger jetty, with a pontoon, 70 feet (21^{m}3) long, and, in 1945, a depth of 14 feet (4^{m}3) alongside; it is connected by a covered way with the railway station. There are landing steps for boats on the north-western side.

Customs or Harbour master's pier, with a pontoon, 30 feet (9^{m}1) long, with a depth of about 10 feet (3^{m}0) alongside, in 1945. North pier, No. 1 and Middle pier, No. 2, known as the **T**-head jetties, with depths of 13 and 11 feet (4^{m}0 and 3^{m}4) alongside, respectively. No. 4 pontoon or Pontoon wharf, with a depth of 12 feet (3^{m}7) alongside. No. 6 or Deep-water wharf, with depths of from 26 to 33 feet (7^{m}9 to 10^{m}1) alongside. No. 7 wharf, also known as No. 5 wharf, on the northern side of the entrance to Sungei Aur, with a depth of 5 feet (1^{m}5) alongside.

The wharves are connected to the general railway system.

On No. 6 wharf are one 5-ton and three 2-ton travelling cranes; on No. 7 wharf are one 5-ton and five 1½-ton steam travelling cranes; there are also two 3-ton travelling cranes available for use on Nos. 1 and 2 wharves for handling cargo from lighters. Two 20-ton and one 35-ton cranes could be brought to No. 6 wharf, but they are only suitable for handling cargo in lighters.

Trade.—Shipping.—The principal exports are tin, rubber, copra, and pineapples; the chief imports are rice, iron and hardware.

In 1938, 1,339 vessels of 3,294,065 tons, entered the port.

Communication.—There is regular steamer communication with Singapore and intervening ports, Penang, and Telok Anson.

Harbour facilities.—No coal is kept in stock, but it may be obtained from Kuala Lumpur at short notice.

Fresh provisions are plentiful. Large quantities of fresh meat can be obtained from Kuala Lumpur. Ice is procurable at Port Swettenham (*Lat. 3° 00′ N., Long. 101° 24′ E.*).

Water may be obtained from stand-pipes on No. 6 wharf and Railway passenger jetty.

There is a hospital at Klang and Kuala Lumpur.

Small repairs to vessels can be carried out at the Marine slipway. Large repairs could be undertaken by special consideration by the

Chart 2153.

Government at their railway workshops at Kuala Lumpur, a distance of 26 miles by rail.

There are several sea-going tugs, numerous lighters of about 80 tons each, and one motor launch capable of towing lighters.

Quarantine station.—There is a large quarantine station southward of the town, consisting of several iron-roofed sheds.

Chart 794.

Klang river.—The banks of Klang river for a distance of 30 or 40 miles in the interior are covered with mangroves and palms. The river is narrow and tortuous, and is not used now by any but small launches, and then only as far as the town of Klang, as the river is there spanned by an iron bridge, which leaves no room for any but very small craft to pass under it.

The town of Klang, about 5 miles by rail from Port Swettenham, is the headquarters of the District Officer, and is of considerable importance, being the centre of a rich rubber-producing district. Klang is connected to the general railway system.

Kuala Lumpur is the capital of Selangor, and the seat of Government of the Federated Malay States. In 1939 the population was 138,425.

Chart 3453.

Selat Lumut.—The south-eastern side of Pulau Lumut is separated from the mainland by Selat Lumut, which has a least width of 1½ cables, and is fringed on both sides of its entrance by mudflats (*see* page 154).

It is not used by any but the natives in their small boats; the Government launches plying between Jugra village and Port Swettenham generally use South Klang strait, and enter Sungei Langat from seaward. It has not been surveyed in detail, but it appears that a small vessel of not more than 10 feet ($3^{m}0$) draught could easily navigate it. About half a mile southward of Tanjong Balei, at its northern end, is Pulau Tonggok (Babi), covered with trees, the tops of which are about 50 feet ($15^{m}2$) high. The best depths are found westward of this island, and from thence by following the general rule of keeping in the bends and avoiding the points, a small vessel of the draught mentioned above could easily navigate this strait.

Chart 794.

COAST.—Between Tanjong Selat Lumut (page 154) and Kuala Langat, 8½ miles south-eastward, the coast is fringed by mudbanks which partly dry and which extend three-quarters of a mile offshore in places.

Charts 794, 795.

Sungei Langat.—Beacon.—Sungei Langat (Jugra) has two mouths, one of which opens into Selat Lumut (chart 3453), and the other into the sea about 2½ miles south-westward of Bukit Jugra. The former mouth is not frequented by any but the natives in their small boats, and has not been surveyed for many years.

The coastal bank, which extends 2 miles from the south-eastern entrance, is steep-to, and shoals suddenly from a depth of 15 fathoms to one foot ($27^{m}4$ to $0^{m}3$), with numerous drying patches between the edge of the bank and the entrance.

There is a depth of about 3 feet ($0^{m}9$) on the bar, situated 9 cables westward of Tanjong Tongkah, the southern entrance point of the

Charts 794, 795.

river, and from 3 to 8 fathoms ($5^{m}5$ to $14^{m}6$), with a width of about a cable within, as far as Bukit Jugra (*Lat. 2° 50′ N., Long. 101° 26′ E.*), on the left bank. The village of Jugra, now deserted, stands at the foot of Bukit Jugra. This hill, known also as Parcelar hill, is 790 feet ($240^{m}8$) high, thickly wooded, and being the only hill near the coast, is easily identified; when seen from north-westward or westward it is of an oblong shape sloping at both ends, but from southward it appears conical. There are considerable depths off Jugra, and the granite face of Bukit Jugra comes close down to the river bank; on the eastern side of the hill is the palace of the Sultan of Selangor. *See* view facing page 164.

Sungei Ayer Hitam, which discharges about 3 miles westward of Kuala Langat, joins Langat opposite Jugra village. Both rivers are reported to be navigable for vessels with local knowledge with a draught of 7 feet ($2^{m}1$) as far as Jugra. Ayer Hitam dries at its mouth.

The channel to Kuala Langat lies close inshore westward of Tanjong Tongkah, its axis being about 3 cables offshore. Local knowledge is necessary for entering. There is a white iron pillar on Tanjong Tongkah.

Anchorage may be obtained by vessels with local knowledge off Jugra village. The tidal streams are strong in the river, and there are snags in places.

Coast.—At Morib, 3¾ miles south-south-eastward of Tanjong Tongkah, there is a Government rest house and sanatorium, also a large bathing palisade which is clearly visible from seaward. A sandbank, which dries, extends for a distance of 1¾ miles off Morib, the depths then increasing rapidly at 4 cables farther seaward. The edge of this bank is difficult to see and should be given a wide berth.

Parcelar point, 4½ miles south-south-eastward of Morib, is not easily identified. About 1¾ miles south-eastward of the point is the village of Batu Laut standing at the mouth of a rivulet, and is clearly visible from seaward. A mudbank, which is steep-to, extends 3 cables offshore at the village.

Between Parcelar point and the entrance to Sungei Sepang besar, 15 miles south-eastward, the coast is low, thickly wooded, and fringed by a sand and mudbank, which extends from a quarter to half a mile offshore; a few small rivulets discharge through it. The coast in this vicinity is featureless and bordered by mangroves with occasional clumps of casuarina trees. At Sungei Rawang, 7½ miles south-eastward of Parcelar point, there is a conspicuous sandy beach, off which there are depths of 12 fathoms ($21^{m}9$) at a distance of 3 cables.

Tidal streams.—Off the coastal bank south-westward of Kuala Jugra the south-east-going stream begins from about 4½ to 4 hours before high water by the shore; at springs it has a rate of 1¾ knots, and at neaps half a knot. The north-north-westerly-going stream begins from about 1½ to 2 hours after high water by the shore; at springs it has a rate of 2 knots and at neaps one knot.

Coast.—Beacon.—Sungei Sepang besar is navigable for craft with local knowledge of about 6 feet ($1^{m}8$) draught for 14 miles; the bar dries, but within, the depths increase to 6 fathoms ($11^{m}0$). The river is the boundary between Selangor and Negri Sembilan.

Sungei Sepang kechil discharges about 2 miles north-westward of Sungei Sepang besar; the entrance channel is marked by stakes.

Charts 3453, 794, 1355, 748b.

Charts 794, 795.

A platform on piles, painted white (the former light-structure), stands on the edge of the drying bank off the entrance to Sungei Sepang besar.

Sungei Lukut, which discharges 4½ miles eastward of Sungei Sepang besar, may be entered at high water springs by vessels with local knowledge of 9 feet ($2^{m}7$) draught; steam launches can ascend about 5 miles; at the mouth of the river is a village. Between the entrance and Tanjong Kamuning (*Lat. 2° 31′ N., Long. 101° 47′ E.*), 3 miles southward, is Pulau Burong, lying about three-quarters of a mile offshore; it is fringed by rocks and surrounded by shallow water.

Off-lying shoals.—Buoy.—Bambek shoal, about 3¼ miles offshore, lies south-westward of the mouth of Sungei Sepang besar; it has a depth of one foot ($0^{m}3$) near its centre, and is composed of hard sand; it is mostly steep-to, the depths increasing suddenly to 8 or 10 fathoms ($14^{m}6$ to $18^{m}3$) within one cable. Between Bambek shoal and the coast is a bank, with depths of from 3¼ to 6 fathoms ($5^{m}9$ to $11^{m}0$), and between the latter and the coast there is a deep channel.

Westward of the north-western extremity of Bambek shoal are detached banks, with depths of from 6¼ to 10 fathoms ($11^{m}4$ to $18^{m}3$), the western 10-fathom ($18^{m}3$) patch lying 6¼ miles west-north-westward of the shoalest part of Bambek shoal.

About 3½ miles eastward of the shoalest part of Bambek shoal is the north-western extremity of a sand ridge, which extends 10 miles south-eastward towards Cape Rachado; on it are two patches each with a depth of 4 feet ($1^{m}2$), situated about 4 and 2½ miles, respectively, from the south-eastern extremity of the ridge, and depths of from 1¾ to 5 fathoms ($3^{m}2$ to $9^{m}1$) over the remainder. Between this ridge and the coast there is a channel with depths of from 12 to 15 fathoms ($21^{m}9$ to $27^{m}4$), about half a mile wide, used by local craft, leading to the anchorage off Port Dickson.

On the north-eastern side of the channel are several shoals and rocks, the most conspicuous being a rock which dries 3 feet ($0^{m}9$), situated 1¾ miles south-eastward of Pulau Arang Arang.

Chart 1143, plan of Port Dickson.

Port Dickson.—Port Dickson, the port of Negri Sembilan, lies immediately southward of Tanjong Kamuning and extends along the coast in the direction of Cape Rachado; it is situated 21 miles by road from the town of Seremban, the principal town in the State. Owing to its long stretches of sand and excellent bathing, it has become one of the health resorts of Malaya. Government sanitoria are situated at various places along the coast, whilst, in addition, there is a commodious Rest house. As the headquarters of the district, it contains the offices of the District Officer, Harbour master and Superintendent of Customs.

Between Tanjong Kamuning and the Railway pier, about 3 cables eastward, the coast is fringed by a flat with some rocks above water on it.

Dangers.—Lights.—Beacons.—Buoys.—Pulau Arang Arang, about 3½ cables south-eastward of Tanjong Kamuning, is fringed by a reef, which dries, extending from half a cable to one cable from its northern, eastern and southern sides.

A pile beacon surmounted by a white disc marks the north-eastern

Charts 794, 795, 1355, 748b.

extremity of the reef extending from the eastern side of this islet. A red conical buoy is moored 1¼ cables eastward of the eastern extremity of the islet.

A light (*Lat. 2° 31′ N., Long. 101° 48′ E.*) is exhibited, at an elevation of 90 feet ($27^{m}4$), from a white circular tower, 40 feet ($12^{m}2$) in height, on the south-western side of Pulau Arang Arang.

A light is exhibited, at an elevation of 30 feet ($9^{m}1$), from a beacon, 15 feet ($4^{m}6$) in height, about half a cable within the head of the Railway pier.

Two leading beacons are situated at Port Dickson ; the front beacon, consisting of a lamp standard, surmounted by a white globe, stands on the Railway pier about 100 feet ($30^{m}5$) southward of the light-structure on that pier ; the rear beacon, consisting of a steel framework structure, surmounted by a white globe, stands about 9 cables east-north-eastward of the front beacon.

A bank, with depths of from 1½ to 3 fathoms ($2^{m}7$ to $5^{m}5$), extends east-south-eastward from Pulau Arang Arang and joins the coastal bank.

A coral patch, with depths of less than 6 feet ($1^{m}8$), lies about 4 cables west-south-westward of the light-structure on Pulau Arang Arang, and is marked on its south-western side by a red conical buoy. A shoal, with a least depth of 13 feet ($4^{m}0$), lies 3¾ cables southward of the light-structure.

Anchorage.—Directions.—Good anchorage may be obtained, in depths of from 10 to 15 fathoms ($18^{m}3$ to $27^{m}4$), westward and south-westward of Tanjong Kamuning. Small vessels may obtain anchorage, in depths of from 4 to 5 fathoms ($7^{m}3$ to $9^{m}1$), north-eastward of Pulau Arang Arang. The oil storage tanks, about 1¾ cables north-westward of the light-beacon on the Railway pier, are conspicuous when approaching the anchorage. Cape Rachado lighthouse (charts 794, 795) should be kept bearing less than 125° until the leading beacons at Port Dickson are in line, bearing 070°, which alignment will lead over the sand ridge, in a depth of about 4¼ fathoms ($7^{m}8$), and about 2¾ cables north-westward of the red conical buoy.

During the South-west monsoon there is a continual swell and rough sea at the anchorage.

Quarantine anchorage.—The quarantine anchorage is westward of the 10-fathom ($18^{m}3$) line with the leading beacons of Port Dickson in line, bearing 070°, and within a distance of 15 cables of the light-beacon on the Railway pier.

Prohibited anchorage.—Anchorage is prohibited in the fairway between Pulau Arang Arang and the mainland, or within half a cable of the Railway pier.

Port regulations.—*See* Appendix II.

Piers.—The Railway pier is 660 feet ($201^{m}2$) in length, and has a least depth of 18 feet ($5^{m}5$) alongside but can only berth a vessel 250 feet ($76^{m}2$) long ; it is connected to the general railway system.

A concrete pier, 657 feet ($200^{m}2$) in length, is situated about one cable westward of the Railway pier. It has a **T**-head, and there is a depth of 19 feet ($5^{m}8$) alongside its outer end ; it will take a vessel 270 feet ($82^{m}3$) long. At the inner end of the pier, there is a sea wall forming a reclamation on which are two oil storage tanks.

Tidal streams.—At the inner anchorage the tidal streams set east-

Chart 1143, plan of Port Dickson.

ward and westward, but seaward of the sand ridge the streams set across the approach, south-eastward from 3½ hours before until 2½ hours after high water by the shore, and north-westward during the remaining period.

Communication.—There is regular communication by steamer with Singapore, Lumut, and Telok Anson; and by rail with the main system of the peninsula.

Port facilities.—A large stock of fuel oil is maintained. Vessels can oil at the rate of 80 tons an hour.

Supplies are easily obtained from Seremban; ice can be procured; water is scarce.

There is a hospital for Europeans at Seremban.

Charts 794, 795.

Coast.—Cape Rachado (*Lat. 2° 24′ N., Long. 101° 51′ E.*) is a steep bluff point, covered with trees, and easily distinguished, as it is higher than the adjacent coast, and appears when first seen in the distance as an island. There are considerable depths about a quarter of a mile off it.

From Cape Rachado the low wooded coast of Sumatra, distant 20 miles, is visible, the strait being narrower here than at any other part north-westward of Malacca.

Light.—**A light is exhibited, at an elevation of 388 feet (118^{m}3), from a white circular tower, 78 feet (23^{m}8) in height, on Cape Rachado.** *See* views facing this page.

The lighthouse is connected to the general telephone system.

Tidal streams.—Off Cape Rachado the tidal streams set south-eastward and north-westward, at a rate of from 2 to 2½ knots; the south-east-going stream begins from 3 to 4 hours after high water at Penang and runs for 6 hours.

Chart 794.

ISLANDS AND DANGERS BORDERING THE FAIRWAY OF MALACCA STRAIT.—Aroeah eilanden.—Light.—Aroeah (Aroa) eilanden lie nearly in mid-channel between the Sumatra coast and North sands (page 165), on a bank, with depths of from 5 to 10 fathoms (9^{m}1 to 18^{m}3), the northern end of which extends 7½ miles north-north-westward from the islands; the southern end joins an extensive mudbank extending from the Sumatra coast. The bank is steep-to on the northern, eastern and western sides.

Noordrots (North rock), the northernmost islet of the group, is about 15 feet (4^{m}6) high, and has a reef extending northward from it.

Byms rock, awash, lies about 1½ miles south-south-westward of Noordrots.

Djemoer (Jemur), an island about 3 miles south-south-westward of Noordrots, is 75 feet (22^{m}9) high, flat and covered with trees. Kalironggo is an islet lying on a reef about 1¾ cables north-eastward of Djemoer, and a reef, which dries, lies about 4½ cables farther north-eastward.

A light (*Lat. 2° 53′ N., Long. 100° 34′ E.*) is exhibited, at an elevation of 144 feet (43^{m}9), from a grey iron framework structure, 79 feet (24^{m}1) in height, on the summit of Djemoer.

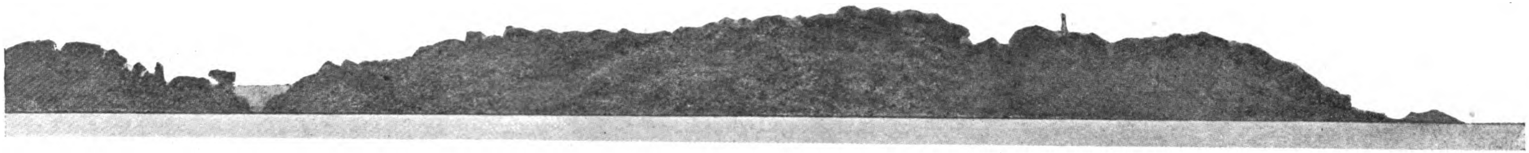
A group of five islets lie on a bank, with depths of less than 5 fathoms (9^{m}1), lying in a north-north-westerly and south-south-easterly direc-

Charts 1355, 748b.

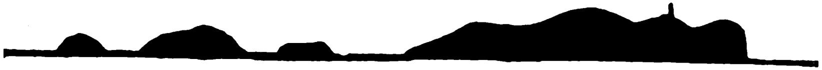
To face page 164.

Bukit Jugra.

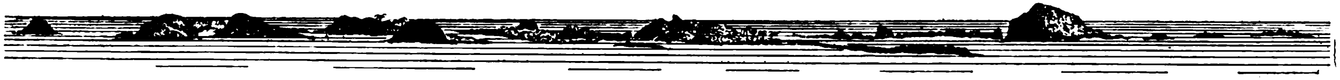
Bukit Jugra, bearing 020°, distant 12½ miles.
(*Original dated* 1902.)



Cape Rachado lighthouse, bearing 096°, distant 3 miles.
(*Original dated* 1902.)



Cape Rachado lighthouse, bearing 113°, distant 23 miles.
(*Original dated* 1942.)


Toekong Sipotiong.
Laboean Bilik.
Sarong Alang.
Pasir Pandan.
Toekong Mas, bearing 273°, 1 mile.

North-western group of Aroeah eilanden.
(*Original dated* 1924.)

Chart 794.

tion, about 6 cables west-south-westward of Djemoer. Toekong Mas, the northernmost of the group, is 104 feet ($31^{m}7$) high; several reefs, which dry, lie within 4 cables northward of Toekong Mas; Pasir Pandan, 65 feet ($19^{m}8$) high, and Sarong Alang, 88 feet ($26^{m}8$) high, lie on the same reef southward of Toekong Mas; Laboean Bilik, 65 feet ($19^{m}8$) high, lies about three-quarters of a cable south-eastward of Sarong Alang; Toekong Sipotjong (Tukong Sipoching) lies 2¾ cables south-south-eastward of Laboean Bilik, with a reef, which dries, between. *See* view facing page 164.

Malay fishermen sometimes visit Djemoer to fish and procure turtle in the season; there are some huts on the island.

Anchorage may be obtained by vessels with local knowledge, in depths of 6 or 8 fathoms ($11^{m}0$ or $14^{m}6$), mud, with Djemoer light-structure bearing 000°.

Batu Berlajar (Balia), a group of six rocks, 3 feet ($0^{m}9$) high, surrounded by a reef, lies about 3¼ miles eastward of Djemoer.

Batu Mandi, 6 feet ($1^{m}8$) high and steep-to, lies about 3 miles eastward of Batu Berlajar, with Half Tide rock, which dries 8 feet ($2^{m}4$) and is steep-to, between them.

Simbang, 121 feet ($36^{m}9$) high to the tops of the trees, is precipitous and the highest of the Aroeah group; it lies about 6 miles south-eastward of Djemoer; there are several rocky islets around it. Toekong (Tekong), 30 feet ($9^{m}1$) high, lies about 1½ miles south-south-westward of Simbang (*Lat. 2° 48′ N., Long. 100° 39′ E.*).

A 3-fathom ($5^{m}5$) patch lies about 2 miles south-eastward of Toekong.

Tidal streams.—Off Aroeah eilanden the south-east-going stream begins from 4 to 5 hours before high water by the shore and runs from one to 2 hours after, at a rate of about 2 knots at springs; the north-west-going stream has a rate of about 3 knots. At neaps, the rate of the south-east-going stream may be considerably reduced, or entirely overcome, by the prevailing north-west-going current.

North sands.—North sands comprise various sandbanks and spits lying between Angsa bank and Aroeah eilanden. The sandbanks have a general north-westerly and south-easterly direction, with depths of from 5 to 18 fathoms ($9^{m}1$ to $32^{m}9$) between them.

The shoalest part of the sands is Batu Kinching, which dries 3 feet ($0^{m}9$) at its south-eastern end, and on which the sea breaks, situated 13¼ miles west-south-westward of Pulau Angsa lighthouse. Blenheim shoal and Goldfinch bank, situated 16½ and 8½ miles, respectively, west-north-westward of the south-western extremity of Pulau Ketam (page 151), have each a depth of 1¼ fathoms ($2^{m}3$).

There is a channel between Angsa bank and the eastern side of North sands, with depths of from 5 to 15 fathoms ($9^{m}1$ to $27^{m}4$); it would be dangerous for large vessels to use unless it was buoyed, as no bearings can be given to direct them. Coasting vessels use this channel, keeping on the edge of Angsa bank, in depths of from 4 to 5 fathoms ($7^{m}3$ to $9^{m}1$).

One-fathom bank.—Light.—Fog signal.—One-fathom bank is a detached patch 15 miles westward of Pintu Gedong light-structure (page 154), and is situated on the north-eastern side of the fairway of Malacca strait. The north-eastern and south-western sides of the bank are steep-to, but north-westward the bank extends, with depths of less than 5 fathoms ($9^{m}1$), for 3 miles, and south-eastward about one mile.

Charts 1355, 748b.

Chart 794.

A light is exhibited, at an elevation of 92 feet ($28^{m}0$), from a grey octagonal concrete tower on piles, with a red lantern, on One-fathom bank. *See* view of the lighthouse on chart 794.

A fog signal is sounded from the lighthouse.

Amazon Maru shoal, over which there is a depth of 3¾ fathoms ($6^{m}9$), lies 2½ miles southward of One-fathom bank lighthouse.

The nearest danger on the south-western side of the fairway is a 3½-fathom ($6^{m}4$) patch at the north-western extremity of South sands, about 8 miles south-westward of One-fathom bank lighthouse (*Lat. 2° 53′ N., Long. 101° 00′ E.*).

Charts 794, 795.

South sands.—South sands are of similar formation to North sands, and extend across with but little interruption to the Sumatra coast. The north-eastern edge of the sands, within the 5-fathom ($9^{m}1$) line, forming the south-western side of the navigable channel through Malacca strait, extends 50 miles in a south-easterly direction, from the 3½-fathom ($6^{m}4$) patch south-westward of One-fathom bank.

The most dangerous banks bordering the fairway, in addition to the 3½-fathom ($6^{m}4$) patch mentioned above, are a bank with a least depth of 4 feet ($1^{m}2$), situated 15 miles south-south-eastward of One-fathom bank lighthouse, and Pyramid shoal; other shallow patches lie mostly south-westward of a line joining these two.

Pyramid shoal, near the south-eastern extremity of South sands, is the more dangerous, as it stands out into the fairway beyond the others and reduces the width of the fairway between the 10-fathom ($18^{m}3$) lines to about 8 miles. The shoal has a least depth of 2 fathoms ($3^{m}7$), hard sand. Bambek shoal, the nearest danger on the north-eastern side of the fairway, lies 11½ miles north-eastward of Pyramid shoal.

For dangers farther south-eastward, *see* page 171.

Dumping ground.—Caution.—A dumping ground for ammunition has been established at the north-western end of South sands. Vessels are warned not to anchor or fish with any kind of drag-net in the area marked by pecked lines in this position.

Tidal streams.—*See* Admiralty Tide Tables for predictions of tidal streams in the vicinity of One-fathom bank and South sands.

Directions.—A vessel approaching from north-westward should sight Djemoer lighthouse and thence steer to make One-fathom bank lighthouse bearing about 112°, passing about 3 miles south-westward of it; thence she should steer to pass about 6 miles off Parcelar point; maintaining this distance offshore will clear Bambek shoal.

The depths near the banks are so irregular that they afford no guide as to the proximity of those dangers.

Chart 795.

COAST.—Dangers.—Beacons.—Sungei Linggi is entered 7 miles eastward of Cape Rachado, the coast between being fringed by a mud-bank, which extends off the bight westward of Tanjong Selamat (Salamat), situated about 5½ miles eastward of Cape Rachado, for a distance of 1½ miles.

The river is navigable for vessels of 8 or 9 feet ($2^{m}4$ or $2^{m}7$) draught, for a distance of about 5 miles from the mouth, and for large boats for 4 or 5 miles beyond. The bar, which has a depth of 12 feet ($3^{m}7$) at

Charts 1355, 748b.

Chart 795.

high water springs, has rocks on either side of it. On the southern entrance point there is a police station, and another 5 miles up stream; a tree stands on the northern entrance point.

A rock, situated between the entrance points of the river, covers when there is a depth of 10 feet ($3^{m}0$) on the bar; it is marked by a beacon.

A 2-fathom ($3^{m}7$) patch lies about one mile south-south-westward of Tanjong Selamat (*Lat. 2° 24′ N., Long. 101° 57′ E.*).

Batu Mandi, a rock awash, lying 1½ miles south-westward of the southern entrance point of Sungei Linggi, is marked by a beacon.

Good anchorage may be obtained off the entrance to Sungei Linggi, in a depth of 9 fathoms ($16^{m}5$), mud, with Cape Rachado lighthouse bearing 292°, and the beacon in the entrance to the river, 075°.

The river should not be entered without a pilot, who may be procured at Malacca. A vessel should approach with the entrance bearing about 050°, passing about 3 cables north-westward of the southern entrance point, thence about a quarter of a cable north-westward of the beacon in the entrance, as the depths decrease rapidly from 7 fathoms ($12^{m}8$) to 3 or 4 feet ($0^{m}9$ or $1^{m}2$) westward of the northern entrance point; thence there appears to be no difficulty for vessels with local knowledge with a draught of about 8 feet ($2^{m}4$), in proceeding about 5 miles up, where anchorage may be obtained in a depth of 4 fathoms ($7^{m}3$) with plenty of room to swing.

Between the southern entrance point of Sungei Linggi and Tanjong Kling, 15 miles south-eastward, the coast consists mostly of irregular rocky points interspersed with small sandy beaches. Batu Tengah consists of three rocks just above water, lying 2 miles south-eastward of Batu Mandi, and about one mile offshore. Pulau Batu besar, 15 feet ($4^{m}6$) high, lies about 1¼ miles offshore and about 7 miles south-eastward of Batu Tengah. A sandy ridge, with depths of from 3¼ to 5 fathoms ($5^{m}9$ to $9^{m}1$), lies from half a mile to 2 miles north-westward of the rock.

There is no safe passage for vessels between Pulau Batu besar and the mainland, as the area is encumbered with rocks, some of which are above water. The outermost rock, which dries 3 feet ($0^{m}9$), lies about 11 cables south-eastward of Pulau Batu besar.

The coast between Tanjong Panchor, situated 10½ miles south-eastward of the southern entrance point of Sungei Linggi, and Tanjong Kling, is fringed by a bank, with depths of less than 3 fathoms ($5^{m}5$), extending three-quarters of a mile offshore near the north-western end; a rock, 12 feet ($3^{m}7$) high, lies about 6 cables south-westward of Tanjong Panchor, and a rock, which dries 3 feet ($0^{m}9$), lies on the outer edge of the bank, about 1½ miles south-eastward of the point.

Chart 1143, plan of Approaches to Malacca.

Tanjong Kling, the north-western limit of Malacca road, is a low projecting point, on which is a Government bungalow. Bukit Minyak, about 195 feet ($59^{m}4$) high to the tops of the trees, lies about 1¼ miles north-westward of it.

Kling shoals, consisting of several patches of rock, extend about one mile south-south-eastward from Tanjong Kling; the shoalest of these has a depth of one foot ($0^{m}3$), and lies 3 cables southward of the point.

MALACCA ROAD AND APPROACHES.—Aspect.—The town of Malacca stands on both sides of the small river of that name which

Charts 1355, 748b.

Chart 1143, plan of Approaches to Malacca.

discharges 5½ miles eastward of Tanjong Kling (*Lat. 2° 13′ N., Long. 102° 10′ E.*), the two parts being connected by several bridges. On the left bank of the river is St. Paul's hill, which is conspicuous, and on the summit of which stands the ruins of an ancient church, also the lighthouse and flagstaff. About one mile eastward of St. Paul's hill is St. John's hill, on which are the remains of an old battery erected by the Dutch, and about 6 cables north-eastward of St. Paul's hill is Bukit China, an almost bare and conspicuous hill, 145 feet ($44^{m}2$) high, with a cemetery on it. Bukit Bruang (chart 795), an isolated hill, 514 feet ($156^{m}7$) high, and Bukit Sebukor, about 210 feet ($64^{m}0$) high to the tops of the trees, lie about 3¾ and 2½ miles, respectively, north-north-eastward of St. Paul's hill.

The country a few miles inland is formed of undulating hills, and 24 miles north-eastward of St. Paul's hill is Gunong Ledang (chart 795), having a triple peak, 4,182 feet ($1275^{m}7$) high; the coast and land near the town are low and wooded.

Islets and dangers.—Beacons.—Pulau Upeh, a densely wooded islet, about 110 feet ($33^{m}5$) high to the tops of the trees, lies one mile offshore and about 2¾ miles westward of St. Paul's hill; it is uninhabited.

A ridge, over which there are depths of less than 3 fathoms ($5^{m}5$), extends about one mile from the western and eastern sides of Pulau Upeh, running parallel with the coast.

A shoal, with a depth of 21 feet ($6^{m}4$), lies 4 cables south-westward of Pulau Upeh; Little shoal, with a depth of 11 feet ($3^{m}4$), lies 5½ cables southward, and 2½ cables farther south-south-eastward is a 17-foot ($5^{m}2$) patch. A 27-foot ($8^{m}2$) patch lies about 1½ miles south-eastward of the same islet.

Between Pulau Upeh and the mainland a bank runs parallel with the coast, extending on both sides of the islet; near its north-western end are the Owen rocks, which dry 5 feet ($1^{m}5$), and near its south-eastern end are two patches which dry from one to 2 feet ($0^{m}3$ to $0^{m}6$).

Pulau Panjang, a narrow rocky flat nearly covered at high water, lies about 2 miles south-south-eastward of St. Paul's hill, and is steep-to on its southern side. A red stone beacon, 23 feet ($7^{m}0$) high, stands on its eastern end and a light beacon (page 169) on its western end.

Foulerton shoal, with a depth of 34 feet ($10^{m}4$), lies 6½ cables south-south-eastward of the light beacon on Pulau Panjang, and a small sandy shoal, with a depth of 15 feet ($4^{m}6$), lies 2½ cables north-north-westward of the beacon on the eastern end.

Pulau Java, consisting of two wooded islets nearly joined, lies 8 cables southward of St. Paul's hill; the western islet is 60 feet ($18^{m}3$) high to the tops of the trees, and the eastern islet 20 feet ($6^{m}1$) high to the tops of the trees.

A rock, which covers at high water, lies 3½ cables south-south-westward of the western islet of Pulau Java, and is marked by a red stone beacon, surmounted by an iron cage, 18 feet ($5^{m}5$) high. A narrow ridge, with depths of less than 3 fathoms ($5^{m}5$), extends about one mile west-north-westward and 3½ cables east-south-eastward from the beacon. Between the north-western end of this ridge and the ridge extending south-eastward from Pulau Upeh are two 3-fathom ($5^{m}5$) patches.

Lights.—A light (*Lat. 2° 12′ N., Long. 102° 15′ E.*) is exhibited, at

Charts 795, 1355, 748b.

Chart 1143, plan of Approaches to Malacca.

an elevation of 140 feet ($42^{m}7$), from a white square tower, 40 feet ($12^{m}2$) in height, on St. Paul's hill.

A light is exhibited, at an elevation of 18 feet ($5^{m}5$), from a white beacon on the western end of Pulau Panjang.

For lights on the piers, *see* page **170**.

Anchorage.—Directions.—The best berth for moderate-sized vessels is about 1½ miles offshore, in a depth of about 6 fathoms ($11^{m}0$), with the lighthouse on St. Paul's hill, bearing 038° and Pulau Panjang light-beacon, 122° ; the holding ground is good, the bottom being chiefly mud, with some sand in greater depths.

Small vessels usually lie closer in off the river entrance, in depths of from 1½ to 3 fathoms ($2^{m}7$ to $5^{m}5$).

The sea worm is very destructive in these waters to vessels and boats with unprotected wooden hulls.

Approaching Malacca road, the most conspicuous objects besides St. Paul's hill, with its lighthouse and flagstaff, are Bukit Bruang, Bukit China and Pulau Upeh.

Charts 1143, plan of Approaches to Malacca, 795.

A vessel approaching the road from westward should pass not less than 2 miles southward of Tanjong Kling and one mile southward of Pulau Upeh to clear the off-lying dangers, and she should not alter course until St. Paul's hill bears less than 055°.

Approaching from eastward, after passing Pulau Undan (page **171**) and Pulau Anyut (page **171**), she should steer to clear Foulerton shoal, whence there is a clear run to the anchorage. Small vessels frequently pass northward of Pulau Besar and Pulau Panjang, but this route should not be used without local knowledge.

There are numerous fishing stakes off the coast but these are clear of the usual routes.

A vessel approaching from south-eastward at night should make Pulau Undan light and after passing south-westward of it, and of Pulau Anyut should bring the light to bear 135° and steer with it astern on that bearing until Malacca light bears 038°, when she should steer for it on that bearing, which will lead to the anchorage. Pulau Undan light will also be seen when approaching the road from north-westward, and may be steered for from abreast Tanjong Kling.

Chart 1143, plan of Approaches to Malacca.

Quarantine anchorage.—The quarantine anchorage is situated southward of Pulau Upeh.

Explosives anchorage.—The anchorage for vessels loading or loaded with explosives, or dangerous petroleum (flash point below 73°), is seaward of a line drawn from Tanjong Kling to Pulau Panjang, and such vessels shall not anchor or berth elsewhere within the port limits except with the permission in writing of the Port officer. Vessels carrying, loading, or discharging explosives, shall display Flag B of the International Code of Signals at the masthead, and at night show a *red* light from the same position.

Charts 1143, plan of Approaches to Malacca, 795.

Port limits.—The limits of the Port of Malacca are defined as follows :—

From Tanjong Kling (*Lat. 2° 13′ N., Long. 102° 10′ E.*) in a straight line to Pulau Anyut, thence in a straight line to the east bank of Sempang river, about 10 miles east-south-eastward of St. Paul's hill, *Chart 1143, plan of Approaches to Malacca, 795.*

thence westward along the coast to Tanjong Kling, including the rivers Sempang, Serkam, Umbai, Punggor, and Duyong as far north as the road leading to Merlimau, Malacca river as far as the site of the old Bunga Raya bridge, and the Ayer Itam as far as the bridge at Tanjong Kling road, and including all piers, jetties, landing places, wharves, quays, docks, and other similar works within the limits above set out, whether within or without the line of high water mark and (subject to any rights of private property therein) all portions of the shore or bank within 50 yards ($45^{m}7$) of high water mark.

Port regulations.—The regulations for the Port of Malacca are contained in the Port of Malacca rules. Articles Nos. 24–36, with the exception of articles 25, 27(2) and (3), and 34, of the Port regulations for Singapore (*see* Appendix II), also apply to the Port of Malacca.

Tidal streams.—The tidal stream sets south-eastward from about 3½ hours before until about 2½ hours after high water at Malacca; for the remainder of the 12 hours it sets north-westward. The rate varies from 2 knots at springs to one knot at neaps.

In Malacca river the ebb stream runs at a rate of from 3 to 4 knots occasionally after heavy rains.

Chart 1143, plan of Approaches to Malacca.

Malacca river.—Piers.—Lights.—The entrance to Malacca river lies between two breakwaters, the channel therein having a depth of 2 feet ($0^{m}6$), and a width of 300 feet ($91^{m}4$) at its entrance.

A light is exhibited, at an elevation of 12 feet ($3^{m}7$), from a concrete column, 14 feet ($4^{m}3$) in height, on the head of each breakwater.

A pier, which dries at its head, lies about one cable south-eastward of the south-eastern breakwater. In 1929, it was in a dilapidated condition.

There are quays on both sides of the river, about 3 cables within the head of the breakwaters (*Lat. 2° 11′ N., Long. 102° 15′ E.*).

The landing place is at the quay, on the eastern side of the river, and there is one at the railway terminus, on the western bank, about 1½ miles up the river.

Malacca.—The town of Malacca is the seat of Government of the British settlement of Malacca, and is a free port. Around the base of St. Paul's hill are the Harbour master's office, post office and other public buildings.

The population of the town in 1931 was 38,042.

Communication.—There is daily communication by steamer with Muar and Singapore, and with other ports occasionally.

Trade.—Shipping.—The principal exports are rubber, rice, copra, tapioca, gambier, areca nuts, hides, and rattans. The chief imports are rice and other foodstuffs.

In 1939, a total of 846 merchant vessels (exclusive of vessels of 75 tons and under), of 1,178,336 tons, entered and cleared the port.

Harbour facilities.—Fresh provisions can be obtained.

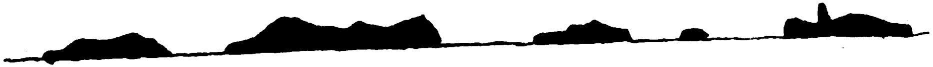
Minor repairs to machinery can be effected. There is a crane with a lifting capacity of 3 tons.

There is a Government hospital for all classes, and an isolation hospital.

Meteorological table.—*See* page 39.

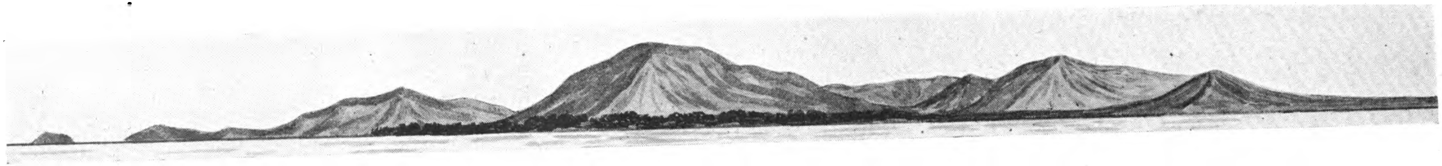
Water islands.—Dangers.—Light.—Water islands consist of a group of seven islands or islets, the largest of which is Pulau Besar

To face page 171.



Pulau Undan lighthouse, bearing 116°, distant 24 miles.

(*Original dated* 1942.)



Bukit Banang, bearing 350°, distant 20 miles.

(*Original dated prior to* 1924.)

Chart 1143, plan of Approaches to Malacca.
(*Lat. 2° 07′ N., Long. 102° 20′ E.*), 328 feet (100^{m}0) high to the tops of the trees, situated about 6½ miles south-eastward of Malacca pier, and 2 miles offshore. The channel between this island and the mainland is foul and rocky, but it is used by small craft with local knowledge.

A bank, with depths of less than 3 fathoms (5^{m}5), extends about one mile from the north-western side of Pulau Besar, and on it is Pulau Serimbun, 109 feet (33^{m}2) high, lying about half a mile from Pulau Besar. A narrow ridge, with a least depth of 17 feet (5^{m}2), lies about one mile north-westward of the northern extremity of Pulau Besar. Lady Weld rock, with a depth of 2 feet (0^{m}6), lies 6 cables west-south-westward of Pulau Serimbun. There are shoal and irregular depths between this rock and the southern extremity of Pulau Besar.

Pulau Anyut, 122 feet (37^{m}2) high, and wooded, lies about 2 miles south-south-westward of Pulau Besar. Pulau Undan, 182 feet (55^{m}5) high, and wooded, lies 3¼ miles southward of Pulau Besar, with Pulau Dodol, 154 feet (46^{m}9) high, and Pulau Nangka, 253 feet (77^{m}1) high, both wooded islets, between.

Lansdown rock, with a depth of 3 feet (0^{m}9), lies 4 cables north-north-eastward of Pulau Dodol.

A light is exhibited, at an elevation of 175 feet (53^{m}3), from a square building with a red rectangular tower, 49 feet (14^{m}9) in height, on Pulau Undan. *See* view facing this page.

Chart 795.

A pinnacle rock, with a depth of 6¾ fathoms (12^{m}3), lies about 1¾ miles east-north-eastward of Pulau Undan.

DANGERS BORDERING THE FAIRWAY OF MALACCA STRAIT.—Raleigh shoal, over which there is a least depth of 2¾ fathoms (5^{m}0), lies 17½ miles southward of Cape Rachado lighthouse and 10 miles from the coast of Sumatra. It is steep-to on its north-eastern and south-western sides, but a bank, with a depth of less than 10 fathoms (18^{m}3), extends about 1¾ miles north-westward and one mile south-eastward from it.

Rob Roy bank lies on a ridge, with depths of less than 10 fathoms (18^{m}3), extending in a north-westerly and south-easterly direction, on the south-western side of the fairway of Malacca strait, about 20 miles south-westward of the town of Malacca. Near the middle of the ridge is a depth of 1¼ fathoms (2^{m}3), about 1½ miles east-south-eastward of which is a patch with a similar depth. The bank is steep-to on the north-eastern and south-western sides.

Vowler bank, with depths of less than 10 fathoms (18^{m}3), lies with its north-western extremity about 5 miles south-eastward of the south-eastern 1¼-fathom (2^{m}3) patch on Rob Roy bank; there is a 5-fathom (9^{m}1) patch close within the north-western end of the bank, and another of the same depth, 3 miles south-eastward of it.

Clark bank consists of two narrow ridges, about 2 miles apart, extending in a north-westerly and south-easterly direction; the north-western ridge, over which there are depths of from 8 to 10 fathoms (14^{m}6 to 18^{m}3), lies about 3½ miles south-eastward of Vowler bank, and the south-eastern ridge has a depth of 10 fathoms (18^{m}3).

Between these banks and the shoals extending from the coast of Sumatra (page 89) there is a deep channel with a least width of 3 miles.

For banks farther south-eastward, *see* page 177.

Charts 1355, 748b.

Chart 795.

COAST.—Between Malacca pier and Tanjong Seginting (*Lat. 1° 47′ N., Long. 102° 53′ E.*), 46 miles south-eastward, the coast, which forms two bays, is low, thickly wooded, and fringed by a mudbank which extends in places, with depths of less than 3 fathoms ($5^{m}5$), for 3 miles offshore. There are numerous fishing stakes inside the 5-fathom ($9^{m}1$) line between Water islands and Tanjong Tohor, situated 13 miles north-westward of Tanjong Seginting.

Chart 1143, plan of Sungei Muar.

Sungei Kesang, which discharges about 15 miles south-eastward of Malacca pier, is the boundary between Malacca and Johore.

Sungei Muar.—Light.—Light-buoys.—Sungei Muar discharges between Tanjong Agas (Gading), about 5 miles south-eastward of Sungei Kesang, and Tanjong Ketapang; its entrance is narrow, and, on account of the flat which extends with depths of less than 3 fathoms ($5^{m}5$) from its mouth, it is only navigable for small vessels. The bar which was reported, in 1932, to have a depth of 5 feet ($1^{m}5$), is of soft mud. Vessels of 5 feet ($1^{m}5$) draught can ascend the river to Kepong, about 60 miles up, but it is very tortuous.

Sungei Muar is the longest river in the State of Johore, and one of its tributaries, the Jempol, is separated from Sungei Serting by a strip of swampy land only 2¼ cables wide. It is therefore easy to drag canoes from one to the other, and as the Serting is a tributary of the Bera which joins the Pahang river, canoes can make the passage from Malacca strait to the China sea by this route.

The banks of the river are inhabited by Malays and rubber planters, many of whom are Chinese.

There is a daily steamer service to Kepong.

A light is exhibited, at an elevation of 41 feet ($12^{m}5$), from a white iron framework beacon on concrete piles, 40 feet ($12^{m}2$) in height, on the northern side of the entrance to Sungei Muar.

A light-buoy, painted white, exhibiting a *white flashing* light *every five seconds*, is moored about 3 miles westward of the light-structure and about 1¾ miles offshore.

A light-buoy, painted red, exhibiting a *white flashing* light *every three seconds*, is moored 3 cables westward of the light-structure.

Chart 795.

Off-lying shoal.—A shoal, with a depth of 2¾ fathoms ($5^{m}0$), lies 7¼ miles westward of the light-structure on the northern side of the entrance to Sungei Muar, and 4½ miles offshore.

Anchorage.—Directions.—Small vessels may obtain anchorage, in a depth of about 2 fathoms ($3^{m}7$), off the mouth of Sungei Muar. Vessels entering the river should pass northward of the outer light-buoy, thence between the light-beacon and the inner light-buoy.

Bandar Maharani.—Bandar Maharani, the headquarters of the State Commissioner, is situated on the eastern side of the entrance to Sungei Muar.

There are seven wharves of a total length of about 600 feet ($182^{m}9$), with a depth of about 6½ feet ($2^{m}0$) alongside, and there is a hand crane, with a lifting capacity of half a ton. Water is laid on to two of the wharves. Fuel oil may be obtained.

The country district extending south-eastward, known as Padang, is a flat alluvial plain about 30 miles long and 10 miles wide, covered with coconut and rubber plantations.

Charts 1355, 748b.

Chart 795.

There is frequent communication by steamer with Singapore and Malacca.

The principal export is rubber, with some coconuts and areca nuts. Tapioca, sago and fruit are cultivated in considerable quantities.

Coast.—Light.—Bukit Muar, an isolated densely wooded hill, 778 feet (237^{m}1) high, lies about 9 miles south-eastward of Sungei Muar light-beacon.

Tanjong Tohor (*Lat. 1° 52′ N., Long. 102° 41′ E.*) is a low point covered with jungle and bordered by mangrove. A mudbank, which is steep-to, extends with depths of less than one fathom (1^{m}8), about 1¼ miles south-south-eastward from the point. The village of Tohor stands close eastward of the point, but is difficult to approach on account of the mudbank.

A light is exhibited, at an elevation of 20 feet (6^{m}1), from an iron framework beacon, 30 feet (9^{m}1) in height, on Tanjong Tohor.

From Tanjong Tohor to Tanjong Seginting the coast is quite featureless, backed by dense jungle, and bordered by mangroves through which numerous creeks run, none of which, however, except Sungei Batu Pahat, is navigable for anything but small boats. There are numerous fishing stakes within the 6-fathom (11^{m}0) line.

Off-lying dangers.—Formosa bank and its north-western extension fronts the coast from Tanjong Tohor to Tanjong Seginting, off which latter point it merges into the 5-fathom (9^{m}1) line fronting the coast. The bank, which has a least depth of 2 fathoms (3^{m}7), is steep-to on its north-eastern and south-western sides. On the extension northwestward is Leslie patch, with a depth of 3¾ fathoms (6^{m}9), and Baker patch, with a depth of 5½ fathoms (10^{m}1). Between these banks and the coastal bank there is a deep channel clear of dangers.

Charts 1143, plan of Batu Pahat, 795.

Sungei Batu Pahat.—Light.—Beacon.—Sungei Batu Pahat is entered between Tanjong Api Api, situated 12 miles east-south-eastward of Tanjong Tohor, and Tanjong Telaga, about 1¼ miles southward. The entrance is narrow and is only navigable for small vessels owing to the existence of a bar.

Within the river there are depths of from 8 to 17 feet (2^{m}4 to 5^{m}2) as far as the town of Batu Pahat, about 3½ miles from Tanjong Api Api, and above the town the depth is slightly greater but the river is much narrower. About 2 miles above the town the river bifurcates, the western branch being called Sungei Simpang Kiri, and the eastern branch Sungei Simpang Kanan. The western branch is reported to be navigable by vessels drawing 6 feet (1^{m}8) for about 20 miles. The eastern branch is only navigable by vessels of very shallow draught. The banks of the river are low and thickly wooded.

Tanjong Telaga (*Lat. 1° 48′ N., Long. 102° 53′ E.*) is a low rocky point and steep-to ; it is the best landing place in the entrance. There are two stone piers close southward of the point which are used for loading stone from the quarries, but they are of no use as ordinary landing places.

Pulau Sialu, a rocky islet with a few huts and trees on it, lies about one cable south-westward of the southern side of Tanjong Telaga.

A light is exhibited, at an elevation of 57 feet (17^{m}4), from a white masonry tower, 49 feet (14^{m}9) in height, on Pulau Sialu.

A mud and sandbank, which dries, extends 1½ miles southward from

Charts 1355, 748b.

Charts 1143, plan of Batu Pahat, 795.

Tanjong Api Api, and between its eastern edge and the mainland eastward of it is the channel into the river, which has a least depth of 2 feet (0m6) in the fairway over the bar westward of Pulau Sialu; the channel, however, is very narrow, and it is safer to assume a depth of one foot (0m3) only unless in possession of local knowledge. The nature of the bottom is hard mud, and there are numerous small pieces of rock which have been deposited by blasting from quarries situated on the eastern side of the entrance. Within the bar a depth of from 3 to 4 feet (0m9 to 1m2) can be carried up to the river entrance.

Bukit Banang, 1,416 feet (431m6) high, is the summit of an undulating range of hills, about 3¼ miles eastward of Tanjong Api Api; there is an iron beacon on its summit. *See* view facing page **171**.

Anchorage.—Directions.—Anchorage may be obtained in any convenient depth south-westward af Pulau Sialu.

A vessel without local knowledge should employ a pilot, who can be obtained through the Customs officer at Batu Pahat. A vessel should approach the entrance bearing about 027°, taking care to avoid the heavy fishing stakes, and pass about one cable westward of Pulau Sialu light-tower; she should continue on this course until she is within one cable of the eastern shore westward of the 198-foot (60m3) hill, situated 8½ cables north-north-eastward of Tanjong Telaga, when she should steer 001° until within half a cable of the opposite shore. Thence the channel runs close to the west bank until about one-third of the way down the first reach when it trends to the opposite bank. After passing through the first reach, she should keep in mid-channel.

Tidal streams.—The in-going stream commences one hour after low water and runs until one hour before high water. The rate of the stream at springs is about 2 knots.

Town.—Wharves.—The town of Batu Pahat, situated on the left bank of the river, is the principal town of the district. There is a small European community, mostly Government officials. There is a Government hospital for all classes. Provisions may be obtained in small quantities.

There are three wharves. No. 1 wharf, which dries alongside, has a **T**-head and is 75 feet (22m9) long; No. 2, with a depth of 4 feet (1m2), is 180 feet (54m9) and No. 3, which is the Government wharf, also with a depth of 4 feet (1m2), is 96 feet (29m3) long. There is also the Asiatic Petroleum Company's pier, with a depth of 6 feet (1m8). Water is laid on to No. 3 wharf.

Fuel oil may be obtained, and taken in at a rate of 30 tons an hour.

The principal exports are rubber, copra and iron ore.

There is frequent communication by steamer with Singapore. A ferry crosses the river at Batu Pahat.

Chart 795.

Coast.—Light.—From Tanjong Seginting (*Lat. 1° 47′ N., Long. 102° 53′ E.*) to Tanjong Piai, 49 miles south-eastward, the coast is low and thickly wooded, and almost entirely bordered with mangroves.

The whole of this stretch of coast is remarkably featureless, and there are few places which can be readily identified. Between Tanjong Seginting and the Sungei Benut, about 25 miles south-eastward, the only part which could be identified without local knowledge is a sand beach situated eastward of the mouth of Sungei Senggarang, 11 miles south-eastward of Tanjong Seginting. Two iron framework light-

Charts 1355, 748b.

Chart 795.

towers off the entrance to Sungei Benut might be identified on a clear day from a distance of 7 or 8 miles. The two villages of Pontian besar and Pontian kechil, situated at the mouths of the rivers of the same names in the centre of the bight between Sungei Benut and Pulau Kukup, 18 miles south-south-eastward, are noticeable. Pontian besar is partially obscured by trees, but Pontian kechil is clear and quite unmistakable. This portion of the coast is fringed by a mudbank, which dries out to a distance of from 3 to 4 cables offshore, receding gradually to Pulau Kukup ; opposite Pulau Kukup it is steep-to, and it then extends again to about half a mile, receding to within 2 cables of the point at Tanjong Piai.

Numerous small rivers and creeks discharge into the sea in this stretch of coast.

Sungei Senggarang is navigable for small vessels with local knowledge as far as Senggarang, about 3 miles from the entrance. There is a post office at Senggarang, and regular communication by steamer with Singapore.

A light is exhibited, at an elevation of 20 feet ($6^{m}1$), from a steel tower at the entrance to Sungei Senggarang. Vessels must pass eastward of the light-tower when entering or leaving the river.

Chart 1143, plan of Benut river.

Sungei Benut.—Lights.—Sungei Benut is the largest river on this part of the coast, and is navigable for small steamers with local knowledge as far as Benut, about 3 miles from the entrance, where there is a concrete wharf, with a depth of 12 feet ($3^{m}7$) alongside. The depth on the bar is 2 feet ($0^{m}6$), and in the river varies from 4 to 14 feet ($1^{m}2$ to $4^{m}3$).

There is frequent communication by steamer with Singapore. There is a post office in the town.

A light is exhibited, at an elevation of 21 feet ($6^{m}4$), from an iron framework beacon, at the entrance to Sungei Benut and a similar light half a mile north-eastward, on the eastern side of the entrance.

Directions.—To enter the river a vessel should approach with the light-structures in line and pass close south-eastward of the outer one, then steer for a point slightly eastward of the inner light-structure until within 1½ cables of it, when she should steer to pass close westward of it, and thence keep in mid-channel.

Chart 795.

Coast.—Sungei Pontian besar and Sungei Pontian kechil, entered 8 and 9¾ miles south-eastward, respectively, of the inner light-structure at the entrance to Sungei Benut, are frequently visited by small vessels from Singapore. They are not navigable beyond the villages situated at their entrances, and both have a depth of only one foot ($0^{m}3$) on the bar.

The entrance channels to all the above rivers, and also other smaller streams, will usually be found to be marked by stakes or rough wooden beacons, but these are continually falling down and cannot be relied on.

Chart 3833.

Pulau Kukup (*Lat. 1° 19′ N., Long. 103° 26′ E.*), a low, flat, and thickly wooded island, is separated from the mainland by a deep steep-to channel, 2 cables in width, and lies on the south-eastern end of a mudbank, which dries out to a distance of 1½ miles north-north-westward ; on the south-western side of the island the bank extends 2 cables, its outer edge being very steep-to.

Chart 3833.

There is a wharf with a depth of 20 feet (6$^{\text{m}}$1) alongside, at the village of Kukup, on the mainland abreast the middle of the island. There is a post office at Kukup, and small vessels from Singapore call regularly.

Charts 3836, 3833.

Tanjong Piai, the southern extremity of the Malay peninsula and of Asia, is a broad tongue of low land having high trees on its western side, and low, bright green mangroves on the eastern side. All the adjacent country is low with the exception of Gunong Pulai (chart 795), an isolated mountain 2,141 feet (652$^{\text{m}}$6) high, 20 miles northward of Tanjong Piai. Tanjong Piai is fringed by a mudbank, which dries out to about one cable from its extremity; it extends about 1¾ miles westward from its western side, and on the eastern side it extends to a distance of about 4 cables offshore. The outer edge on the western side is remarkably steep-to. Substantial erections of fishing stakes exist in the vicinity of the point, effectually marking the position of the edge of the bank. *See* view facing this page.

Caution.—In passing Pulau Kukup and Tanjong Piai caution must be exercised, as the east-going stream sets strongly towards the coastal bank, and the west-going stream towards Long bank, on the opposite side of the fairway.

Chart 795.

Off-lying island and dangers.—Light.—Nares bank, with a least depth of 6¾ fathoms (12$^{\text{m}}$3), lies parallel with the coast, 5¼ miles southward of Pulau Sialu light-tower; it is steep-to on its south-western and north-eastern sides.

Foulerton patches, with a least depth of 5 fathoms (9$^{\text{m}}$1), extends 2¼ miles south-eastward from a position 6 miles south-south-eastward of Pulau Sialu light-tower.

Pulau Pisang, 441 feet (134$^{\text{m}}$4) high, thickly wooded and of rocky formation, lies about 7 miles southward of the outer light beacon at the entrance to Sungei Benut. Pulau Tunda, 239 feet (72$^{\text{m}}$8) high, and Pulau Kamudi, 330 feet (100$^{\text{m}}$6) high, lie on the same bank, about half a mile westward of Pulau Pisang. Pulau Sauh, 236 feet (71$^{\text{m}}$9) high, lies close eastward of Pulau Pisang. There is a stone pier, which dries alongside, on the south-eastern side of Pulau Pisang.

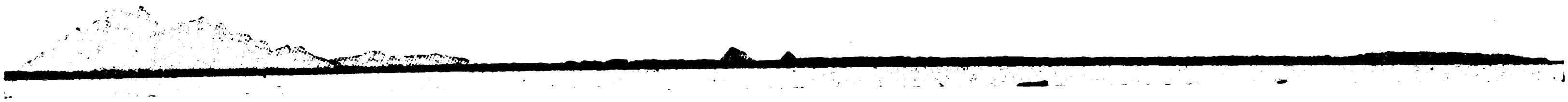
A light (*Lat. 1° 28′ N., Long. 103° 15′ E.*) is exhibited, at an elevation of 493 feet (150$^{\text{m}}$3), from a red circular tower, 53 feet (16$^{\text{m}}$2) in height, on the summit of Pulau Pisang. *See* view facing this page.

Within a line joining Tanjong Seginting and Pulau Pisang, the depths are irregular, there being patches of from 3 to 4 fathoms (5$^{\text{m}}$5 to 7$^{\text{m}}$3), with from 6 to 8 fathoms (11$^{\text{m}}$0 to 14$^{\text{m}}$6) close-to; vessels should therefore keep seaward of this line.

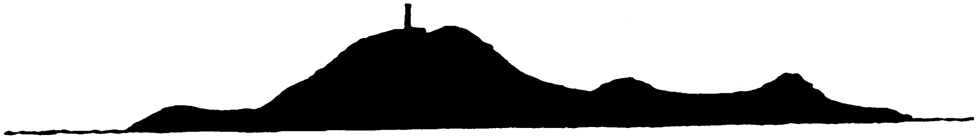
A bank, with a general depth of from 3 to 4 fathoms (5$^{\text{m}}$5 to 7$^{\text{m}}$3), and with 2¾ fathoms (5$^{\text{m}}$0) 2 miles from its outer end, extends about 5 miles north-westward of Pulau Pisang. A narrow spit, which is steep-to, with a depth of 1¾ fathoms (3$^{\text{m}}$2) at its extremity, extends about 5 miles south-eastward from Pulau Pisang. A channel about three-quarters of a mile wide, with a least depth of about 6¼ fathoms (11$^{\text{m}}$4), lies between this spit and the main 3-fathom (5$^{\text{m}}$5) line, passing north-eastward of Pulau Pisang. This channel should not be used without local knowledge. A shallow bank extends north-westward from Pulau Kukup to beyond Pulau Pisang and depths of less than one fathom (1$^{\text{m}}$8) extend 6½ miles from the former.

Charts 2403, 3543, 1355, 2660, 941a.

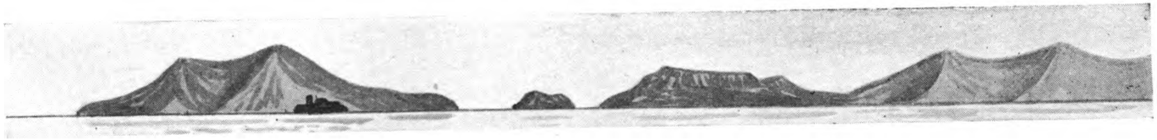
To face page 176.


Gunong Pulai.
Tanjong Piai.

Tanjong Piai, bearing 115°, distant 13 miles.
(*Original dated* 1902.)



Pulau Pisang lighthouse, bearing 096°, distant 12 miles.
(*Original dated* 1942.)


Klein Karimoen
The Brothers.
Groot Karimoen.

The Brothers and Karimoen eilanden from north-westward.
(*Original dated prior to* 1924.)

Charts 3833, 795.

Between this bank and the mainland there is a channel which is constantly used by the small vessels plying along the coast. In the northern entrance to this channel, eastward of Pulau Kukup, there is a least depth of 1½ fathoms ($2^{m}7$), and the depths in the channel vary from 12 fathoms ($21^{m}9$), opposite Pulau Kukup, to 1¼ fathoms ($2^{m}3$) in the southern entrance.

Chart 795.

BANKS BORDERING THE FAIRWAY OF MALACCA STRAIT.—Fair Channel bank, a narrow bank lying approximately parallel with the coast, extending the whole distance between Foulerton patches and Pulau Pisang, or over a distance of 20 miles, is steep-to, and has a least depth of 4¾ fathoms ($8^{m}7$), about 7 miles westward of Pulau Pisang lighthouse.

A bank, with a least depth of 6¼ fathoms ($11^{m}4$), lies about 2 miles north-eastward of the middle of Fair Channel bank, and about 12 miles north-westward of Pulau Pisang.

Long bank lies on the south-western side of the fairway about 7 miles from Fair Channel bank and parallel with it; there is a least depth of 3¼ fathoms ($5^{m}9$) over several parts of the bank.

Another bank of similar character, with a least depth of 6½ fathoms ($11^{m}9$), lies about midway between Long bank and the south-eastern end of Fair Channel bank. The fairway of the strait lies between this bank and the south-eastern end of Fair Channel bank.

South-westward of Long bank are numerous similar banks lying parallel with it, extending to within a short distance of the banks fringing the Sumatra side of the strait; the positions and nature of these banks can best be seen on the chart.

Charts 3833, 795.

SINGAPORE STRAIT.—Western entrance.—The entrance to Singapore strait from westward lies between Tanjong Piai on the north and Klein Karimoen (page 96), with the Brothers, north-westward of it, on the south. The navigable channel is about 7½ miles wide and deep.

Islands.—Dangers.—Light.—The Brothers, named Pulau Ijoe (Iyu) besar and Pulau Ijoe (Iyu) kechil, are each 146 feet ($44^{m}5$) high, lying in a west-south-westerly and east-north-easterly direction about 6 cables apart, about 2½ miles north-westward of Klein Karimoen. *See* view facing page 176.

A light (*Lat. 1° 12′ N., Long. 103° 21′ E.*) is exhibited, at an elevation of 131 feet ($39^{m}9$), from a white iron framework structure, 36 feet ($11^{m}0$) in height, on Pulau Ijoe kechil. The keeper's dwelling, a white building with red tiles, stands below it.

A rock, with a depth of 4 feet ($1^{m}2$), lies 2½ cables north-eastward of Pulau Ijoe kechil, and a rock, with a depth of 8 feet ($2^{m}4$), lies about 2 cables northward of the same islet. A rock, awash, lies 2½ cables north-westward, and a rock, with a depth of 15 feet ($4^{m}6$), lies 4 cables southward of the islet. All these rocks are steep-to.

Karimoen eilanden are described with the east coast of Sumatra on page 96. They are prominent when approaching Singapore strait from either direction.

CHAPTER VI

SINGAPORE STRAIT, INCLUDING THE ISLAND, PORT AND ROAD OF SINGAPORE, AND JOHORE STRAIT

Chart 2403.

SINGAPORE STRAIT.—Singapore strait is bounded on the north by the Malay peninsula and Singapore island, and on the south by the Boelan (Bulan) archipelago, and two large islands, Batam and Bintan. The entire length of the strait is about 60 miles, and its width at the western entrance about 10 miles; at the eastern entrance it is 11½ miles wide abreast Tanjong Datok, but southward of Singapore, between St. John islands and Batu Berhanti, it is only 2½ miles wide; the fairway is deep throughout.

Heavy rain squalls, during which visibility is moderate or poor, are frequently experienced in the strait; the colours and topmarks of the various beacons are then useful guides.

Local weather.—*See* page 30.

Pilots.—Pilots for Singapore generally cruise near or westward of Cyrene reefs, but they may be obtained in the vicinity of Sultan shoal if they are instructed by masters, ship owners, or agents; pilotage is not compulsory.

The pilot boats are painted white, and show a red and white flag (horizontal, upper half white), with the letter P, in blue, in the centre.

Pilotage waters include the area lying within lines drawn from Siglap obelisk, the north-eastern boundary of Singapore road, to the obelisk on Peak island, about 5½ miles south-westward, thence to the south-eastern extremity of St. John islands, thence to Sultan shoal lighthouse, thence to the north-eastern extremity of Cyrene reefs, produced to meet Singapore island.

Tidal streams.—*See* remarks on pages 194–195 and in Admiralty Tide and Tidal Stream Tables for South-east Asia.

Chart 3833.

WESTERN PART OF SINGAPORE STRAIT.—Northern shore.—Dangers.—Tanjong Piai (*Lat. 1° 16′ N., Long. 103° 31′ E.*), the northern entrance point of the western end of Singapore strait, has been described on page 176.

Between Tanjong Piai and Tanjong Gul, the south-western extremity of Singapore island, about 9 miles east-north-eastward, lies the western entrance of Johore strait, which is fronted by a bank, with depths of less than 3 fathoms ($5^{m}5$), extending to within about 3 cables of the line joining the two entrance points.

Charts 2757, 3543, 1355, 2660a, 941a, 1263.

Chart 2587.

Alert shoal, with a depth of 16 feet ($4^{m}9$), lies 5½ miles east-north-eastward of Tanjong Piai, and on the line joining that point and Tanjong Gul.

Charts 2587, 3837.

Selat Sembulan.—Dangers.—Beacons.—Selat Sembulan is a channel with a least width of 4 cables leading from westward, to the western entrance of Keppel harbour. The depth in the fairway is not less than 6 fathoms ($11^{m}0$), but it is only suitable for small craft. It lies between the south-west coast of Singapore island on the north, and the group of islands which separates it from Selat Sinki on the south. There is no difficulty for small craft navigating this strait, but large vessels should use Selat Sinki (page 180).

Chart 2587.

Tanjong Gul, the north-western entrance point, is low at its extremity, but is 135 feet ($41^{m}1$) high on its north-western side where it is covered with trees. Between this point and Tanjong Penuru, the western entrance point of Sungei Pandan, about 5 miles eastward, the coast consists of mangrove swamps, backed by hills, from about 100 to 200 feet ($30^{m}5$ to $61^{m}0$) high, and fronted by reefs, on which are Pulau Samulun, 70 feet ($21^{m}3$) high, and Pulau Damar Laut, 55 feet ($16^{m}8$) high.

Long shoal, over which there are depths of from 12 to 15 feet ($3^{m}7$ to $5^{m}5$), lies with its eastern end half a mile south-eastward of Tanjong Gul.

A small reef, which dries 3 feet ($0^{m}9$), lies 2 cables from the northern shore and 9 cables eastward of Tanjong Gul (*Lat. 1° 18′ N., Long. 103° 40′ E.*); it is marked at its southern extremity by a white beacon, No. 26, surmounted by a drum.

Pulau Pesek, 65 feet ($19^{m}8$) high, is the westernmost of the group of islands on the southern side of Selat Sembulan. A reef, which dries from 2 to 3 feet ($0^{m}6$ to $0^{m}9$), extends about 4 cables westward from the island, with a similar, but detached reef, close southward of it, which latter is marked at its western extremity by a red stone beacon, No. 23. A sunken rock lies 1½ cables south-westward of the beacon.

Triton shoal, with a least depth of 21 feet ($6^{m}4$), extends about one mile west-south-westward from beacon No. 23.

A reef extends 1¾ cables east-north-eastward from Tanjong Chombum, the north-eastern point of Pulau Pesek, and 2¼ cables farther in the same direction is a rock nearly awash. About 1½ cables north-westward of the same point is a rock, which dries 5 feet ($1^{m}5$).

Pulau Ayer Chawan, 89 feet ($27^{m}1$) high, is the central and largest island of the group. A reef, which dries from one to 3 feet ($0^{m}3$ to $0^{m}9$), extends about 2 cables from the south-western side, and on it is Tanjong Pang Kong, an islet 30 feet ($9^{m}1$) high.

Charts 2587, 3837.

Pulau Merlimau, 90 feet ($27^{m}4$) high, lies 5½ cables eastward of Pulau Pesek; the northern side is fringed by a reef which dries from one to 3 feet ($0^{m}3$ to $0^{m}9$), and extends about one cable offshore. Terembu Opi, a reef which dries 2 feet ($0^{m}6$), and Pulau Mesemut Laut, fringed by a reef, lie close off the north-eastern end of Pulau Merlimau.

Pulau Seraya is separated from the south-eastern side of Pulau Merlimau by a passage which is encumbered with several islets and reefs.

Charts 2757, 3543, 1355, 2660a, 941a, 1263.

Charts 2587, 3837.

Pulau Seburus Luar, which is fringed by a reef, lies about 3 cables eastward of Pulau Seraya, with Pulau Seburus Dalam between.

The other islands of the group are described with Selat Sinki on page 181.

Sungei Jurong discharges on the eastern side of Tanjong Balai, 3¾ miles eastward of Tanjong Gul. A reef, on which lies Pulau Chichir, extends 4½ cables south-eastward from Tanjong Balai, and the eastern side of the entrance to the river is fringed by a reef, which dries from one to 3 feet ($0^{m}3$ to $0^{m}9$), extending 1¾ cables offshore.

Chart 3837.

Fronting the mouth of Sungei Pandan are several reefs which dry from one to 5 feet ($0^{m}3$ to $1^{m}5$), and on which are some boulders; these reefs lie as much as three-quarters of a mile offshore between the entrance to the river and Tanjong Mat, about 2½ miles south-eastward of Tanjong Penuru.

For one mile south-eastward of the eastern entrance point of Sungei Pandan, the coast is fringed by mangroves, but thence to Kubu Batu Belayar (*Lat. 1° 16′ N., Long. 103° 48′ E.*), about 3 miles farther south-eastward, there is solid ground, backed by a ridge of grassy hills, near the north-western end of which is Bukit Pasir Panjang, known locally as Buona Vista hill, 270 feet ($82^{m}3$) high, the summit of the ridge.

Buona Vista pier, with a **T**-head lies about one mile north-westward of Kubu Batu Belayar, with a least depth of 30 feet ($9^{m}1$) at its head, but 28 feet ($8^{m}5$) close westward of it.

Cyrene reefs, about one mile south-eastward of Pulau Seburus Luar, and on the southern side of Selat Sembulan, are described with Selat Sinki on page 182.

Charts 3836, 3837.

Selat Sinki.—Islets and dangers.—Lights.—Beacons.—Buoyage.—Selat Sinki is the deep channel by which Keppel harbour is approached from Malacca strait, and is bounded on either side by islands and reefs. At its narrowest part southward of Cyrene reefs, at the eastern end of the channel, it is 7 cables wide between the 6-fathom ($11^{m}0$) lines on either side, and in the fairway there are general depths of from 10 to 16 fathoms ($18^{m}3$ to $29^{m}3$). The channel is marked by lights and beacons which are described below, the beacons on the northern side being white, and on the southern side red. The channel is used by large vessels and is available at all times.

Charts 3836, 2587.

Sultan shoal or Terembu Karimon, on the northern side of the western entrance to Selat Sinki, lies about 3¼ miles southward of Tanjong Gul; on it are some rocks which dry about 6 feet ($1^{m}8$), and a spit, with a depth of 21 feet ($6^{m}4$) at its outer end, extends about 1¼ cables westward from the lighthouse, but the eastern side is steep-to. A short pier extends north-eastward from the lighthouse.

A light is exhibited, at an elevation of 60 feet ($18^{m}3$), on a tower on a two-storeyed dwelling, on Sultan shoal.

Chart 3836.

A light is exhibited, at an elevation of 21 feet ($6^{m}4$), from a white iron framework structure, close to the eastern end of the wreck situated 3 cables south-eastward of Sultan shoal light-tower. Vessels should not pass between this light structure and Sultan shoal light-tower.

Charts 3833, 2403, 795, 2757, 3543, 1355, 2660a, 941a, 1263.

Chart 3836.

A buoy, No. 1, is moored 3 miles south-westward of Sultan shoal light-tower.

Ajax shoal, on the northern side of the fairway, lies about one mile south-eastward of Sultan shoal; it is composed of coral with sharp pinnacles, and has a least depth of 3 fathoms ($5^{m}5$). The depths increase gradually north-westward of the shoal, but the channel side is steep-to.

A light-buoy, painted red, exhibiting a *white flashing* light *every three seconds,* is moored on the western side of Ajax shoal.

A red buoy, marked " A," is moored about 1¼ miles southward of Ajax shoal.

Charts 3836, 2587.

The northern shore of the strait is formed by the southern islands of the group which lie between it and Selat Sembulan. Pulau Sakra, the westernmost, is 81 feet ($24^{m}7$) high at its western end. Close eastward of it, situated on the eastern part of a reef which dries from 2 to 3 feet ($0^{m}6$ to $0^{m}9$), is Pulau Bakau, a low mangrove island.

A reef, which dries 2 feet ($0^{m}6$), lies about one mile westward of the western extremity of Pulau Sakra. Several banks, with depths of from 5 to 6 fathoms ($9^{m}1$ to $11^{m}0$), lie in the vicinity of this reef. A reef, which dries from 2 to 3 feet ($0^{m}6$ to $0^{m}9$), lies 3 cables southward of the reef which extends 2¾ cables from the southern side of Pulau Sakra, and is marked on its southern side by a white beacon, No. 2, surmounted by a white staff and ball.

A buoy, marked " B 2," is moored about three-quarters of a mile south-eastward of No. 2 beacon.

A rock, with a depth of less than 6 feet ($1^{m}8$), lies 2½ cables south-eastward of the eastern extremity of Pulau Bakau (*Lat. 1° 15′ N., Long. 103° 42′ E.*).

Chart 3836.

Pulau Salu, about 54 feet ($16^{m}5$) high to the tops of the trees, lies at the western end of a reef which is steep-to, on the southern side of Selat Sinki, about 1¾ miles southward of No. 2 beacon.

Charts 3836, 3837.

A light is exhibited, at an elevation of 26 feet ($7^{m}9$), from a red pile beacon, No. 1, which marks the north-western edge of a reef which dries from one to 2 feet ($0^{m}3$ to $0^{m}6$), situated 1¼ miles north-eastward of Pulau Salu.

Charts 3836, 2587, 3837.

Pulau Ayer Merbau, 60 feet ($18^{m}3$) high, lies about 4 cables north-eastward of Pulau Bakau; at the southern extremity of the island is a conspicuous red earth cliff, 39 feet ($11^{m}9$) high.

A small patch, which nearly dries, lies 4½ cables eastward of the red cliff, and midway between is a similar but larger patch; both these patches are steep-to.

For Pulau Seburus Dalam and Pulau Seburus Luar, north-eastward of Pulau Ayer Merbau, *see* page 180.

Chart 3837.

Pulau Busing, 1½ miles eastward of No. 1 beacon, is about 82 feet ($25^{m}0$) high to the tops of the trees, and is fringed by a reef. A detached reef, which dries 2 feet ($0^{m}6$), lies about 2½ cables westward of Pulau Busing, and another small reef about the same distance north-

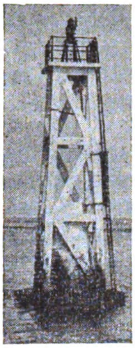
Charts 3833, 2403, 795, 2757, 3543, 1355, 2660a, 941a, 1263.

Chart 3837.

westward of the islet, is marked by a red beacon, No. 3, surmounted by a staff and cage.

No. 5 beacon, similar to No. 3, marks the centre of the northern edge of the reef on which Pulau Busing lies.

Cyrene reefs lie in the fairway at the eastern end of Selat Sinki, but the direct channel is southward of them. They consist of four patches which dry from one to 3 feet ($0^{m}3$ to $0^{m}9$), with deep water between them.



Cyrene reefs light-structure. (*Original dated* 1923.)

A white beacon, No. 4, surmounted by a staff and cage, stands on the southern extremity of the reefs.

A light is exhibited, at an elevation of 27 feet ($8^{m}2$), from a white framework structure, known as No. 6 beacon, on the south-eastern extremity of Cyrene reefs.

A light is exhibited, at an elevation of 30 feet ($9^{m}1$), from a white concrete pile beacon on Kubu Batu Belayar.

Between Cyrene reefs and the entrance to Keppel harbour the bottom is irregular, the least depth being 6½ fathoms ($11^{m}9$), situated about 1¼ miles east-north-eastward of No. 6 beacon.

Pulau Bukum forms the southern side of the eastern entrance to Selat Sinki, its northern extremity, which borders the channel, being situated about one mile southward of No. 6 light beacon. It is 120 feet ($36^{m}6$) high near its south-eastern end, and is fringed by a reef, except for about 4 cables on its north-eastern side. There is a noticeable flagstaff at the south-eastern end of the island. Pulau Bukum is in telephonic communication with Singapore.

On the north-eastern side of the island is Bukum pier, with a depth of 34 feet ($10^{m}4$) alongside, 1½ cables south-eastward of which there is a wharf, 700 feet ($213^{m}4$) long, with a depth of 33 feet ($10^{m}1$) alongside its southern end for a distance of about 400 feet ($121^{m}9$), shoaling gradually to 28 feet ($8^{m}5$) at its northern end ; a vessel alongside would have a depth of 8 fathoms ($14^{m}6$) on her off side ; the wharf is easy to approach.

The northern extremity of the reef, which extends from the north-western end of Pulau Bukum, is marked by a red beacon, No. 7 (*Lat. 1° 14′ N., Long. 103° 46′ E.*), surmounted by a staff and cage.

Off the north-eastern side of Pulau Bukum are several shoal patches lying on a ridge running parallel with it. A red beacon, No. 9, surmounted by a staff and ball, marks a small reef, awash, situated 6½ cables east-south-eastward of No. 7 beacon.

A patch, with a depth of 3¾ fathoms ($6^{m}9$), lies 1¼ cables south-eastward of No. 9 beacon, and is marked on its northern side by a red and black chequered buoy, surmounted by a small red cage.

A small reef, awash, lies 2½ cables south-eastward of Bukum pier, and is marked at its north-western end by a red beacon No. 11, with a staff and cage, and at its south-eastern end by No. 13 beacon, similar to No. 11.

A reef extends 2½ cables south-eastward from the south-eastern extremity of Pulau Bukum, and sunken rocks extend 1½ cables farther. A reef, which dries 2 feet ($0^{m}6$), lies 2¾ cables southward of the southern extremity of Pulau Bukum.

For islets and reefs farther south-eastward, *see* page 183.

Charts 3833, 2403, 795, 2757, 3543, 1355, 2660a, 941a, 1263.

Chart 3837.

A bank, with depths of less than 6 fathoms (11m0), lies eastward of the south-eastern end of Pulau Bukum; the least depth is 4 fathoms (7m3), situated about 12 cables eastward of the wharf; there are irregular depths eastward and south-eastward of the bank.

Two blue and white spherical buoys are moored 10½ and 13½ cables, eastward of No. 13 beacon; submarine cables extend from these buoys westward to Pulau Bukum. Vessels are prohibited from anchoring in their vicinity.

Caution.—A conical light-buoy, painted in red and white bands, and exhibiting a *green group flashing* light, showing a group of *three* flashes *every fifteen seconds*, is moored about 1¼ miles east-north-eastward of the northern extremity of Pulau Bukum. Vessels are cautioned not to pass northward of a line between this light-buoy and No. 6 beacon, north-westward, unless displaying the special signal given by the Examination Service.

Prohibited anchorage.—Beacons.—Two beacons, painted in black and white bands and surmounted by two white discs above a board marked " Cable ", situated on the north-eastern side of Pulau Bukum, indicate the landing place of telephone cables, the tracks of which are shown on the chart. Vessels are prohibited from anchoring north-westward of a line drawn in a 233° direction from Kubu Batu Belayar to the north-eastern side of Pulau Bukum, bounded on the south by a line drawn in a 270° direction from the north-western extremity of Pulau Bukum to the western harbour limit, and on the west by a line drawn thence in a 000° direction along this limit to the coast.

Tidal streams.—Alongside the wharf at Pulau Bukum (*Lat. 1° 14′ N., Long. 103° 46′ E.*) the tidal stream sets north-westward with the west-going stream in Selat Sinki, and south-eastward with the east-going stream.

Charts 3836, 2587.

Anchorage.—Directions.—Vessels from westward arriving off Sultan shoal at night, and waiting for daylight, may obtain anchorage, in depths of 11 or 12 fathoms (20m1 or 21m9), within one mile northward of the lighthouse. They should not anchor between one and 1½ miles northward, nor within 2½ miles southward of the shoal, owing to the existence of submarine cables in the vicinity.

Chart 3833.

From abreast and westward of Sultan shoal vessels may steer to pass on either side of the light-buoy marking Ajax shoal, but the channel southward of it is preferable; thence in mid-channel between the beacons marking the reefs on either side of the strait, to the entrance to Keppel harbour, thence follow the directions given on page 201.

Islands and dangers southward of Selat Sinki.—A group of islands and reefs, about 5 miles in extent, north and south, by about 6 miles east and west, lies southward of Selat Sinki; those bordering that strait have been described with it. They are separated by deep channels, but so encumbered with reefs as to render them unavailable for anything but small craft.

Charts 3836, 3837.

Pulau Sudong, about 55 feet (16m8) high to the tops of the trees, lies at the eastern end of an extensive reef which dries from one to 2 feet

Charts 3836, 3837.

(0m3 to 0m6), and is situated about 1¼ miles south-eastward of Pulau Salu, with a red rock, 12 feet (3m7) high, and some bushes between. A conspicuous tree stands on the reef, 4¾ cables westward of Pulau Sudong.

Chart 3837.

Between the reef marked by No. 1 beacon (page 181) and Pulau Bukum there are several islets and reefs, the positions of which can best be seen on the chart.

Pulau Semakau, about 85 feet (25m9) high to the tops of the trees, lies near the centre of the group; it is surrounded by drying reefs, and is separated from the adjoining islands by narrow and deep channels, which are encumbered by reefs.

There is a small Chinese village at the south-western end of Pulau Semakau, and the landing here is the best in the island; there are several Malay houses on the western side. The vegetation is mangroves and coconut palms.

A reef, which dries from 2 to 4 feet (0m6 to 1m2), lies 5½ cables south-south-eastward of Pulau Semakau; on its northern extremity is a sand cay, 4 feet (1m2) high, with another, 2 feet (0m6) high, 1½ cables southward of it.

About 2½ cables south-westward of the southern sand cay is a patch, which dries one foot (0m3), lying on the south-eastern edge of a bank, with depths of from 3 to 18 feet (0m9 to 5m5); close westward of the south-western side of this bank, another bank, with depths of from one to 18 feet (0m3 to 5m5), extends about one mile west-north-westward.

Pulau Sakeng, about 97 feet (29m6) high to the tops of the trees, is fringed by a reef, and lies half a mile eastward of Pulau Semakau.

Pulau Sebarok, the eastern island of the group, is 55 feet (16m8) high, and fringed by a reef which extends 3¾ cables south-eastward from the south-eastern extremity; for reef and buoy situated about a quarter of a mile farther south-eastward, *see* page 187.

There is a concrete pier, 390 feet (118m9) long, with an arm 50 yards (45m7) long, alongside which vessels up to 8,000 tons are berthed in a depth of 33 feet (10m1). There are several large stores or godowns close to the pier, and a few buildings. There are several warping buoys off the pier. The tidal stream off the island sets north-westward and south-eastward at a maximum rate of about 2½ knots at springs.

There is telephone communication between Pulau Sebarok (*Lat. 1° 12' N., Long. 103° 48' E.*) and Singapore.

Pulau Jong, 75 feet (22m9) high, wooded, and conspicuous, lies half a mile north-westward of Pulau Sebarok; it is fringed by a reef which extends 2 cables south-eastward from it. For reefs north-westward of Pulau Jong, *see* page 182.

Chart 3833.

MAIN STRAIT.—Islets and dangers.—Lights.—Karimoen eilanden, on the southern side of the western approach to Main strait, have been described on pages 96-97. Eastward of these islands, between them and Nipa, about 5¾ miles southward of Sultan shoal lighthouse, is the northern entrance to Straat Doerian (Durian), described in Eastern Archipelago Pilot, Vol. IV.

Charts 2403, 795, 2757, 3543, 1355, 2660a, 941a, 1263.

Chart 3836.

Nipa, an islet, 3 feet ($0^{m}9$) high, lies near the south-eastern end of a coral reef, which dries from one to 8 feet ($0^{m}3$ to $2^{m}4$), and which is the north-westernmost of a chain of islets and reefs extending 5 miles south-eastward, forming the southern side of Main strait. A sandbank extends from the northern side of the islet along the north-eastern edge of the reef, and there are a few trees on the reef.

A light is exhibited, at an elevation of 31 feet ($9^{m}4$), from a white iron framework structure, 26 feet ($7^{m}9$) in height, at the northern end of the reef on which Nipa is situated.

A shoal, with a depth of 34 feet ($10^{m}4$), lies one mile north-north-eastward of Nipa light-structure.

Kent rocks lie about half a mile apart in a north-westerly and south-easterly direction and are usually marked by tide-rips; the north-western rock, with a depth of 4 feet ($1^{m}2$), lies one mile eastward of Nipa; the south-eastern rock has a depth of 7 feet ($2^{m}1$), and both rocks are steep-to.

Chart 3833.

Pelampong, an islet, about 38 feet ($11^{m}6$) high to the tops of the trees, lies on the eastern edge of a reef, about 2¾ miles south-eastward of Nipa; it is of a peculiar red colour with a few trees on it. Several fishermen's huts are situated on the islet. Several small reefs, which dry from 2 to 3 feet ($0^{m}6$ to $0^{m}9$), lie within 1½ miles south-westward of Pelampong.

Takong besar, an island, about 87 feet ($26^{m}5$) high to the tops of the trees, lies 5½ cables south-eastward of Pelampong; it is fringed by a reef, which dries from one to 5 feet ($0^{m}3$ to $1^{m}5$), on which, at its northern end, is a rock 4 feet ($1^{m}2$) high.

Chart 3837.

Takong kechil, an islet, about 82 feet ($25^{m}0$) high to the tops of the trees, is thickly wooded, and lies about half a mile southward of Takong besar; at its southern extremity is a red cliff, 40 feet ($12^{m}2$) high. The reef which fringes it extends about 2 cables from the western and southern sides.

Two detached reefs which dry 7 and 5 feet ($2^{m}1$ and $1^{m}5$), lie about 2 cables northward and north-eastward, respectively, of Takong kechil, and a small reef lies about the same distance southward of the island.

A light (*Lat. 1° 06′ N., Long. 103° 43′ E.*) is exhibited, at an elevation of 31 feet ($9^{m}4$), from a white iron framework structure, 26 feet ($7^{m}9$) in height, on the detached reef southward of Takong kechil.

For Phillip channel, between Takong kechil and Labon, about 3½ miles eastward, *see* page 186.

Charts 3836, 3837.

Pulau Pawai or Alligator island, on the northern side of Main strait, lies 7 cables southward of Pulau Sudong; it has a conspicuous summit, 147 feet ($44^{m}8$) high, which is bare, except for a clump of trees. The island is fringed with reef, and in Selat Sudong, the channel which separates it from Pulau Sudong, there is a large reef, a part of which dries 5 feet ($1^{m}5$). Pulau Berkas, fringed by a reef, lies about 3 cables eastward of Pulau Pawai, being separated by Selat Berkas, in which there is a least depth of 6 fathoms ($11^{m}0$).

Pulau Senang or Barn island, about half a mile south-eastward of Pulau Pawai, is 115 feet ($35^{m}0$) high and is fringed by a reef which extends about 2 cables from the north-eastern side and about one

Charts 3836, 3837.

cable from the south-western side, which is steep-to. In Selat Pawai, which separates Pulau Pawai and Pulau Senang, there is a least depth of 6 fathoms (11^{m}0) in the fairway, but there are some detached reefs near the middle of the eastern end.

Chart 3837.

Pulau Biola or Rabbit islet, 69 feet (21^{m}0) high, lies on the south-western end of a reef, and about 2 cables south-eastward of Pulau Senang, being separated by Selat Biola, a deep channel, except for a rock with a depth of less than 6 feet (1^{m}8) over it in the middle of its western end. A detached reef lies about one cable south-westward of Pulau Biola, and forms with the latter the southern side of Selat Biola.

Charts 3836, 3837.

Pulau Satumu or Coney islet lies 2 cables southward of Pulau Biola ; a reef, which is steep-to, extends one cable southward from the islet ; there is a small pier on its eastern side.

A light is exhibited, at an elevation of 105 feet (32^{m}0), from Raffles lighthouse, a white tower, 91 feet (27^{m}7) in height, on Pulau Satumu.

Chart 3836.

A bank, 4½ miles long, within the 10-fathom (18^{m}3) line, with a least depth of 28 feet (8^{m}5), lies on the north-eastern side of the fairway of Main strait, 1¼ miles west-south-westward of the southern extremity of Pulau Pawai.

Charts 3837, 2403.

Phillip channel.—Dangers.—Phillip channel, leading into Main strait from southward, lies between Takong besar (*Lat. 1° 07′ N., Long. 103° 43′ E.*) and Takong kechil on the western side, and the numerous islands fronting Batam and Boelan on the eastern side. The navigable channel is 3 miles wide between the reef, which dries, 2 cables north-eastward of Takong keckil, and the reef extending westward from Labon. The channel is a short route for vessels proceeding to or from Singapore through Straat Doerian.

Chart 2403.

A bank, with a depth of 51 feet (15^{m}5), lies in the middle of the channel, about 1½ miles east-south-eastward of Takong kechil light-structure.

Charts 3837, 2403.

Pulau Pemping besar, the largest of the north-western islands of Boelan archipel, lies on the eastern side of Phillip channel, and is composed of several moderately elevated hills, the summit being 219 feet (66^{m}7) high. The island is fringed by a reef which extends about one mile from its south-western side and about 3½ cables from its north-eastern side ; several rocks above water lie on the reef, and a wooded rock lies close off its northern extremity.

Labon consists of two islets, the northern of which is 95 feet (29^{m}0) high, bare, and conical, and fringed with mangroves ; it lies 6½ cables westward of Pemping besar, with reefs which dry between. A reef, which dries from 2 to 4 feet (0^{m}6 to 1^{m}2), extends about 3 cables westward and northward from the northern islet, and a bank, on which there is a reef, which dries from 3 to 4 feet (0^{m}9 to 1^{m}2), and a depth of 6 fathoms (11^{m}0) at its outer end, extends about 7 cables farther north-north-eastward.

Chart 2403.

Between Pemping besar and the northern extremity of Kapala

Charts 3833, 2403, 795, 2757, 3543, 1355, 2660a, 941a, 1263.

Djernih (Jernih), about 2½ miles south-westward, there is a bight encumbered with reefs, with depths of from 6 to 10 fathoms ($11^{m}0$ to $18^{m}3$) between. A detached reef lies close south-westward of Labon.

Tanjong Djernih (Jernih), 221 feet ($67^{m}4$) high, precipitous and remarkable, is the north-western extremity of Kapala Djernih. Islets and rocks extend south-westward from the south-western side of the island, encumbering the north-western entrance to Straat Tjombol (Chombol), which is described in Eastern Archipelago Pilot, Vol. IV. Djankat (Jangkat), an islet 103 feet ($31^{m}4$) high, is the south-westernmost islet of this group, and lies about 4½ miles south-south-westward of Tanjong Djernih.

Tjoela (Chula), a bare rock of a yellowish colour, 40 feet ($12^{m}2$) high, with a flat summit and vertical sides, lies about 2½ miles west-north-westward of Tanjong Djernih; it is fringed by a reef which extends about 1½ cables from it, with depths of from 4 to 5 fathoms ($7^{m}3$ to $9^{m}1$) at 3 cables off.

Between Tjoela and Tanjong Djernih is Midden Aarwater rif (Mid-channel reef) and between the latter and Tanjong Djernih is another detached reef. Although there is deep water between Tjoela and Midden Aarwater rif, vessels are recommended not to use these channels.

Helen Mar reef is the outer and north-westernmost of the dangers which lie off the north-western end of Boelan, and is the turning point from Phillip channel into Main strait for eastward-bound vessels. It consists of two patches, the western of which dries 2 feet ($0^{m}6$), and the eastern 7 feet ($2^{m}1$); both are steep-to..

Pelampong in line with Djantan (Jantan), the highest peak of Groot Karimoen, bearing 266°, leads 3 cables northward of Helen Mar reef.

A coral patch, with a depth of one fathom ($1^{m}8$), lies 3 cables south-south-eastward of the southern extremity of the eastern patch of Helen Mar reef, and there are reefs which dry between it and Pemping besar.

A rock, with a depth of 3 feet ($0^{m}9$), lies 8½ cables northward of Pemping besar.

Eastern end of Main strait.—Dangers.—Beacon.—Buoys.—Lights.—Buffalo rock (*Lat. 1° 09′ N., Long. 103° 49′ E.*), 5 feet ($1^{m}5$) high, with a patch which dries 2 feet ($0^{m}6$) close southward of it, lies 3 miles north-eastward of Helen Mar reef, and on the southern side of the fairway of Main strait; the rock is steep-to, and is marked by a white pyramidal beacon.

Soebar (Subar), 60 feet ($18^{m}3$) high, lies about 3 miles north-eastward of the northern extremity of Pemping besar. On the south-eastern side of a line joining them there are numerous islands and reefs which dry, the positions of which can best be seen on the chart. Within 1¼ miles southward of Soebar are Niroep (Nirup), Tjatoer (Chatur), Mariam, Kapal kechil, Kapal besar and Manek islets.

On the northern side of Main strait, a reef which dries 2 feet ($0^{m}6$), lies 6½ cables south-eastward of Pulau Sebarok (page 184), and is marked at its south-eastern end by a red conical buoy, surmounted by a ball.

A bank, with a least depth of 7½ fathoms ($13^{m}7$), lies about three-quarters of a mile south-eastward of the reef which dries.

Pulau Jong (page 184), bearing 304°, open well north-eastward of Pulau Sebarok, leads north-eastward of the reef south-eastward of Pulau Sebarok.

Chart 3833.

The northern extremity of Pulau Senang, situated close north-westward of Raffles lighthouse, in line with Djantan, the summit of Groot Karimoen, bearing 258°, leads southward of the reef.

Belakang Padang, the largest of the islands on the southern side of Main strait, is generally low, covered with jungle, and fringed by a reef, which extends 4½ cables from its western side. There is a pier on the north-eastern side of the island.

A light is exhibited, at an elevation of 18 feet ($5^{m}5$), from a white iron framework structure, 13 feet ($4^{m}0$) in height, on a detached reef close northward of the reef on which Belakang Padang lies.

A light is exhibited from the head of the pier on the north-eastern side of Belakang Padang.

Teloep (Telup), an islet, 70 feet ($21^{m}3$) high at its southern end, and Senang, an islet, 40 feet ($12^{m}2$) high, lie on the same reef, situated about a quarter of a mile north-westward of Belakang Padang. A small reef, which dries 2 feet ($0^{m}6$), lies about midway between Teloep and the north-western point of Belakang Padang, and a reef, awash, lies about 3¾ cables westward of Teloep. A spit, on which there is a small reef which dries 2 feet ($0^{m}6$), extends with depths of less than 3 fathoms ($5^{m}5$), for half a mile north-eastward from the north-eastern end of the reef on which Teloep and Senang lie. A 34-foot ($10^{m}4$) patch lies 3 cables north-westward of Senang.

Chart 1995.

Batu Berhanti (*Lat. 1° 11′ N., Long. 103° 53′ E.*), two rocky ledges, 2½ cables apart, the centres of which are above water, lie about one mile northward of Belakang Padang light-structure.

A light is exhibited, at an elevation of 35 feet ($10^{m}7$), from a white iron framework structure, 43 feet ($13^{m}1$) in height, on the western ledge of Batu Berhanti.

A 29-foot ($8^{m}8$) patch lies 2¼ cables north-north-westward of Batu Berhanti light-structure, and a 13-foot ($4^{m}0$) patch lies about 3 cables north-eastward.

A spherical buoy, painted in black and white bands, is moored 9¼ cables south-eastward of Batu Berhanti light-structure; it marks an ammunition spoil ground.

Chart 3838.

A 29-foot ($8^{m}8$) patch lies 2¾ cables south-south-eastward of the light-structure. The depths near these dangers are irregular, affording no reliable guide for a vessel approaching them.

A bank about 2½ miles in length, east and west, within the 10-fathom ($18^{m}3$) line, and with a least depth of 29 feet ($8^{m}8$), lies with its western end about 1¼ miles east-north-eastward of Batu Berhanti light-structure.

Owing to the strong tidal streams which prevail in this part of the strait, and the rocky and uneven nature of the bottom, violent eddies and overfalls are usually to be met with; it is therefore advisable to keep on the northern side of the strait.

Reede Poeloe Sambo.—Dangers.—Beacons.—Buoys.—Reede Poeloe Sambo is situated between the islands of Anak Sambo, Sambo and Mariam on the north-east, and Belakang Padang and the island northward of it on the south-west. It has a least width of 2 cables between Sambo and Belakang Padang.

Anak Sambo, 100 feet ($30^{m}5$) high, lies about 8 cables south-east-

Charts 3833, 2403, 795, 2757, 3543, 1355, 2660a, 941a, 1263.

Chart 3838.

ward of Batu Berhanti, and is fringed by a reef. Sambo ledge lies about 1½ cables north-westward of the island, and about 1¼ cables farther is a shoal, on which there is a rock awash. A shoal, with a depth of 10 feet ($3^{m}0$), lies about three-quarters of a cable west-south-westward of Sambo ledge.

Sambo, fringed by reef except on part of the south-western side, lies 2¼ cables south-eastward of Anak Sambo. There are several white tanks on the island which are noticeable from westward; some others stand on the summit and are visible from northward and eastward. A flagstaff, situated about 2¾ cables from the south-eastern extremity of the island, is conspicuous.

A bank, with depths of from 23 to 36 feet ($7^{m}0$ to $11^{m}0$), extends about 3 cables eastward from the reef fringing the north-eastern side of Sambo.

A beacon, surmounted by a white ball, marks the southern edge of the reef, extending from the southern side of Sambo.

On the south-western side of the island there are six wharves, with depths of from 11 to 30 feet ($3^{m}4$ to $9^{m}1$) alongside, numbered from I to VI from north-west. Nos. I to III are for large vessels. No. VI is the Government wharf and is the longest.

Mariam, fringed by reef, lies 2¾ cables southward of Sambo (*Lat. 1° 10′ N., Long. 103° 54′ E.*). There is a channel on either side of the islet leading into Straat Boelan, that on the western side being only half a cable wide with a depth of 6 fathoms ($11^{m}0$). On the northern side of Mariam the channel is wider, but it should not be used by low-powered vessels, as the tidal streams are strong.

A beacon, surmounted by a black truncated cone, marks the northern edge of the reef extending from the northern side of Mariam.

About a quarter of a mile south-westward of Mariam is a 2½-fathom ($4^{m}6$) patch, and between the latter and the western side of Pulau Belakang Padang there are reefs.

Anchorage.—Directions.—Anchorage may be obtained by small vessels in Reede Poeloe Sambo, in depths of from 7 to 8 fathoms ($12^{m}8$ to $14^{m}6$), abreast wharves Nos. V and VI. Vessels arriving off the roadstead at night should anchor off the north-eastern side of Sambo, in depths of from 11 to 19 fathoms ($20^{m}1$ to $34^{m}7$).

A vessel approaching from westward should steer for the middle of the entrance to Reede Poeloe Sambo, bearing 141°. If approaching from eastward she should pass northward of Batu Berhanti and thence steer for the entrance as directed for a vessel from westward.

The channel between Anak Sambo and Sambo is suitable only for small craft.

Tidal streams.—During the west-going stream in Main strait the tidal stream sets south-westward between Anak Sambo and Sambo, and between Sambo and Mariam, thence towards the light beacon northward of Belakang Padang, and thence north-westward. An eddy extends along the south-western side of Sambo, being occasionally felt as far south-eastward as the beacon marking the edge of the reef fringing the southern side of the island.

During the east-going stream in Main strait, the stream at the anchorage sets south-eastward; before it turns north-westward an eddy is sometimes experienced off the north-eastern side of Belakang Padang.

Charts 3833, 2403, 795, 2757, 3543, 1355, 2660a, 941a, 1263.

Chart 3838.

Harbour facilities.—Fresh water and ice may be obtained.

A large quantity of fuel oil is maintained on Sambo.

There is a Port Medical officer.

Communication.—There is regular communication by steamer with other ports in the Netherlands East Indies.

Deratisation.—*See* page 17.

Submarine cable.—A submarine cable is laid between Sambo and Tanjong Katong (*Lat. 1° 18′ N., Long. 103° 54′ E.*), about 2½ miles eastward of Singapore; the route of the cable is shown on the chart and vessels should avoid anchoring in its vicinity.

Pilot station.—Signals.—A Netherlands pilot station is established on Sambo. Pilotage is compulsory. For signals, *see* page **18.**

These signals will be answered as follows:—

Signal.	*Signification.*
By day, a black cylinder; by night, a rocket.	Vessel has been observed.
By day, the Company's flag, the National flag, or the vessel's signal letters in the International Code of Signals; by night, a *red* light.	Pilot is proceeding to the vessel.
By day, a ball above two cones, points up, disposed vertically; by night, a *red* light above two *white* lights, similarly disposed.	Vessel cannot be attended to at once, and for this, or other reasons, must wait outside until further notice.
By day, two cones, bases together, disposed vertically, or a diamond shape; by night, a *white* light over a *green* light, disposed vertically.	No pilot is available. Vessel may enter without a pilot.
By day, a ball above a cone, point up, disposed vertically; by night a *red* light over a *white* light, similarly disposed.	Pilot will not board vessel outside. Vessel may enter without a pilot until one is met with.

Pilots when signalled for, meet vessels off Batu Berhanti. The channel taken from Batu Berhanti to Reede Poeloe Sambo is that westward of Sambo ledge and Anak Sambo.

Pilotage at night to or from the roadstead is prohibited. Vessels arriving off the port at night, and displaying their Company's signal, will be furnished with a pilot at daybreak.

Pilots are forbidden to proceed during thick or foggy weather, when navigational marks are not visible.

The pilot vessel, which is usually alongside Wharf No. VI, displays a blue flag with a white star.

Straat Boelan.—Straat Boelan is the narrow and tortuous passage which separates Boelan from Batam. Its northern entrance lies between Mariam and Tanjong Pinggir, 9 cables south-eastward, and between them are three detached reefs, which dry. The fairway lies between Mariam and the northern side of the north-westernmost reef.

A sunken rock lies about half a mile northward of Tanjong Pinggir.

For description of Straat Boelan, *see* Eastern Archipelago Pilot, Vol. IV.

Chart 1995.

Islands and dangers in southern approach to Keppel harbour.—Lights.—Beacons.—Light-buoy.—Pulau Subar Darat or North

Chart 1995.

Sister, and Pulau Subar Laut or South Sister, 79 and 67 feet ($24^{m}1$ and $20^{m}4$) high, respectively, lie about 2¼ miles east-north-eastward of Pulau Sebarok (page 184). Both islands are wooded, but on Pulau Subar Laut the trees are only on the southern side. The islands are fringed by reefs which are steep-to, and are separated from each other by a passage about half a cable wide, with a least depth in the middle of 33 feet ($10^{m}1$); the channel between them and West St. John island is deep and clear of danger.

A shoal, with a depth of 35 feet ($10^{m}7$), lies one mile south-eastward of Pulau Subar Laut.

Chart 3837.

A bank, with depths of less than 10 fathoms ($18^{m}3$), extends about 2 miles westward from the Sisters; on its southern edge is a shoal with depths of from 3 to 6 fathoms ($5^{m}5$ to $11^{m}0$).

Terembu Selegi (*Lat. 1° 14′ N., Long. 103° 50′ E.*), a coral reef which dries 2 feet ($0^{m}6$), lies 7 cables north-north-westward of Pulau Subar Darat, and is marked by a red stone beacon, No. 15, surmounted by a cage, on the eastern edge. A bank, with depths of less than 6 fathoms ($11^{m}0$), extends about 1¼ cables northward and south-eastward from the reef.

Chart 2023.

Palawan reef, which dries, lies about 1½ miles north-north-westward of Terembu Selegi, and about one cable from the reef fringing the south-western side of Pulau Blakang Mati; it is fairly steep-to, and is marked half a cable from its north-western end by a white conical beacon surmounted by two balls.

Chart 1995.

St. John islands, consisting of West St. John island or Pulau Sakijang Bendera, and East St. John island or Pulau Sakijang Pelepah, are the outermost islands lying on the northern side of Main strait, extending southward from Keppel harbour, and are 100 and 175 feet ($30^{m}5$ and $53^{m}3$) high, respectively; both islands are fringed by reef, and between them is Cooper channel, one cable wide between the reefs, with a least depth of about 9 fathoms ($16^{m}5$) in the fairway.

A light is exhibited, at an elevation of 195 feet ($59^{m}4$), from a steel framework tower, 21 feet ($6^{m}4$) in height, on the summit of East St. John island.

The quarantine station for Singapore is on West St. John island, and there are several hospital buildings and fumigating sheds in telephonic communication with Singapore. Landing is easily effected at a stone jetty on the eastern side of the island.

East St. John island is the burial place for those who have died from an infectious disease.

Peak island or Pulau Tembakul, about 1¾ cables eastward of East St. John island, is 87 feet ($26^{m}5$) high, and is fringed by a reef which extends about 2¼ and 1¼ cables, respectively, north-westward and southward from it. There are a few native huts on the island, and a joss house on the rock close westward of it.

A white stone obelisk on the south-eastern side of Peak island marks the south-eastern limit of the Port of Singapore.

A red conical light-buoy, exhibiting a *green group flashing* light, showing a group of *two* flashes *every ten seconds*, is moored 7 cables south-eastward of Peak island.

Charts 3838, 3833, 2403, 795, 2757, 3543, 1355, 2660a, 941a, 1263.

Chart 1995.

The channel between East St. John island and Peak island is less than one cable wide between the reefs on either side, with a least depth of 8 fathoms ($14^{m}6$).

Pulau Seringat or Renget besar lies on the southern side of a reef which dries from 3 to 8 feet ($0^{m}9$ to $2^{m}4$), northward of East St. John island, from which it is separated by Freyberg channel, about half a cable wide between the reefs on either side. Pulau Renget kechil, 8 feet ($2^{m}4$) high, lies about three-quarters of a cable within the south-western extremity of the reef.

A white pile beacon, surmounted by a ball, marks the north-eastern extremity of the reef, and a similar beacon marks the southern edge of the reef, about 1¾ cables eastward of Pulau Seringat. A red beacon, surmounted by a ball, marks the edge of the reef extending from the north-western extremity of East St. John island.

A light (*Lat. 1° 14′ N., Long. 103° 51′ E.*) is exhibited from a red beacon at the south-western extremity of the reef, about three-quarters of a cable south-westward of Pulau Renget kechil.

Chart 1995.

A light is exhibited from a white beacon which marks the south-eastern edge of a reef which dries 5 feet ($1^{m}5$), situated about 1¾ cables north-westward of Pulau Seringat. The channel between this reef and that on which Pulau Seringat lies is named Fairburn channel, and is about three-quarters of a cable wide.

The beacons mentioned above are for the use of steam launches proceeding to or from St. John islands.

A bank, with a least depth of 15 feet ($4^{m}6$) near its south-eastern end, extends 4½ cables north-westward with depths of less than 36 feet ($11^{m}0$), from a position about 2¼ cables northward of the beacon marking the north-eastern extremity of the reef on which Pulau Seringat lies. This bank is situated on the western side of the quarantine anchorage. *See* page 193.

The clock tower of Telok Ayer fish market on Raffles quay, Singapore, in line with Fort Canning lighthouse, bearing 345°, leads to the eastern entrance of Keppel harbour in a least depth of 34 feet ($10^{m}4$).

Pulau Tekukor lies between West St. John island and the southern extremity of Pulau Blakang Mati. Between the latter island and Pulau Tekukor are two shoals in mid-channel, with depths of 2½ and 2¾ fathoms ($4^{m}6$ and $5^{m}0$). There are other reefs north-eastward of Pulau Tekukor, the positions of which can best be seen on the chart. Only small craft with local knowledge can safely navigate between them, the tide-rips and eddies being very strong in the passage northward of Pulau Tekukor.

Submarine cable.—A telephone cable is laid from the north-eastern side of West St. John island; the route, which trends north-westward, is shown on the chart, and vessels should avoid anchoring in its vicinity.

Chart 3837.

Anchorages.—*Examination anchorage.*—The Examination anchorage is situated in the western approach to Keppel harbour. The limits are shown by pecked lines on the chart.

Western Explosives anchorage.—The western Explosives anchorage is situated east-north-eastward of the Examination anchorage. The

Charts 3833, 2403, 795, 2757, 3543, 1355, 2660a, 941a, 1263.

Chart 3837.

limits, which are shown by pecked lines on the chart, are given in Appendix I.

Dangerous Petroleum anchorage.—The Dangerous Petroleum anchorage is situated south-eastward of Pulau Bukum. The limits, which are shown by pecked lines on the chart, are given in Appendix I.

Quarantine anchorage.—A quarantine anchorage, intended only for use in bad weather when the anchorage off Peak island (*see* Appendix I) is unsafe, and by steamers which have previously notified the Master Attendant at Singapore by radio of their intention to anchor there on arrival, is situated off the south-western side of Pulau Blakang Mati, southward of Palawan reef. The limits of this anchorage are shown by pecked lines on the chart, and are given in Appendix I.

Chart 2023.

Pulau Blakang Mati.—Reefs.—Beacons.—Buoy.—Pulau Blakang Mati is hilly and is separated from the southern side of Singapore island by Keppel harbour; Tanjong Rimau (*Lat. 1° 16′ N., Long. 103° 48′ E.*), the western extremity of the island, lies about 1¾ cables south-south-eastward of Kubu Batu Belayar.

Mount Serapong, the summit, 292 feet ($89^{m}0$) high, is barren, and is situated near the north-eastern extremity of the island; it is conspicuous when approaching Singapore road from either direction.

About 1½ cables south-eastward of Tanjong Rimau is Mount Siloso, on the summit of which is a clump of fir trees, the tops of which have an elevation of 226 feet ($68^{m}9$). About 3¾ cables eastward of Mount Siloso is Mount Imbiah, 204 feet ($62^{m}2$) high, and farther south-eastward are other hills covered with small trees and scrub.

Off Tanjong China, the southern extremity of the island, a reef extends about 1½ cables and dries from 4 to 6 feet ($1^{m}2$ to $1^{m}8$), and thence about the same distance from the south-western side of the island. Palawan reef has been described on page 191.

A reef fringes the eastern side of the island terminating in Berhala spit, about 2¾ cables eastward of Tanjong Berhala, the cliffy north-eastern extremity of the island, which is 40 feet ($12^{m}2$) high, forming the southern side of the eastern entrance to Selat Sengkir. On the reef is a patch which dries 7 feet ($2^{m}1$), with a rock on it one foot ($0^{m}3$) high.

The north-eastern extremity of Berhala spit is marked by a red stone beacon, No. 14, surmounted by an iron cage. A spit, with a least depth of 13 feet ($4^{m}0$), extends one cable northward from Berhala spit.

Buran Darat, off the eastern side of Pulau Blakang Mati, is a coral reef, with occasional patches of sand and rocky heads, which dry from 6 to 7 feet ($1^{m}8$ to $2^{m}1$). A spit, with a least depth of 4 feet ($1^{m}2$), extends about one cable northward from the north-western extremity of the reef.

The passage between Buran Darat and the fringing reef of Pulau Blakang Mati, known as Water Boat channel, has a least depth of 18 feet ($5^{m}5$) in the fairway.

A white stone beacon, No. 17, surmounted by a ball, marks the north-eastern extremity of Buran Darat, and a white stone beacon, No. 19, surmounted by a cage, marks its north-western extremity. A black can buoy is moored about three-quarters of a cable eastward of No. 17 beacon. A white stone beacon, No. 21, surmounted by a

Charts 3833, 2403, 795, 2757, 3543, 1355, 2660a, 941a, 1263.

Chart 2023.

cage, marks the western edge of Buran Darat, 4 cables south-south-westward of No. 19 beacon. A red beacon, No. 12, surmounted by a cage, marks the edge of the reef on the western side of the channel, about 6¼ cables southward of No. 14 beacon.

Measured distance.—A measured distance of 6,080 feet ($1853^{m}2$), for small vessels, has been established on the south-western side of Pulau Blakang Mati. The south-eastern limit is marked by the line of two beacons each surmounted by a diamond-shape, 12 feet ($3^{m}7$) in height, situated about 2¼ cables north-westward of Tanjong China (*Lat. 1° 14′ N., Long. 103° 50′ E.*), and the north-western limit by the beacon on Palawan reef in line with a similar beacon to the south-eastern beacons and the south-eastern extremity of the hospital north-eastward of it. The course for running the distance is 122° or 302°.

Charts 3836, 3837.

Directions for Main strait.—In proceeding eastward through the western part of Singapore strait, from a mid-channel position between Klein Karimoen and Tanjong Piai, where there are depths of about 20 fathoms ($36^{m}6$), no directions are necessary for a steam vessel, beyond keeping in the fairway, observing that Raffles lighthouse, bearing 101°, leads midway between the 28- and 34-foot ($8^{m}5$ and $10^{m}4$) patches, situated about 1¼ and 3½ miles west-south-westward, respectively, of the southern extremity of Pulau Pawai, and on either side of the fairway.

Having passed Nipa lighthouse, a vessel should steer to round Raffles lighthouse at a distance of from half a mile to one mile, thence steer to pass about half a mile southward of St. John islands, keeping Raffles lighthouse bearing more than 245°, to avoid the rocks south-eastward of Pulau Sebarok. Care should be taken to avoid the shoal, with a depth of 35 feet ($10^{m}7$), about one mile south-eastward of Pulau Subar Laut.

After passing West St. John island, and bound to Singapore road, she should proceed as directed on page 207; but if bound through the eastern part of the strait, she should shape course to pass northward of Horsburgh lighthouse, and proceed as directed on page 220.

Chart 3833.

Tidal streams.—*See* Admiralty tide tables for predictions of tidal streams in the western approaches to Keppel harbour, and the notes on tidal streams in Singapore strait.

The stream generally follows the directions of the channels, during one period setting westward, north-westward or south-westward, and at the other eastward, north-eastward or south-eastward; the rate at any moment is approximately the same over the whole area, and the stream turns everywhere at approximately the same moment.

Charts 3836, 3837.

The strength of the stream may be increased off salient points and slack water may be found, or eddies occur, on the lee side of these; when the stream is strong, overfalls and swirls may be formed, due to inequalities of the bottom. The more important of these are:

(*a*) Eddies and swirls occur on the south-eastern side of the channel between Pulau Pesek and Pulau Ayer Chawan near low water.

(*b*) In Selat Sinki there is a confused sea during westerly winds when the stream is setting westward.

Charts 3836, 3837.

(*c*) Remarkable eddies and swirls occur between the Sisters and West St. John island; a vessel at anchor in this channel, obtaining tidal stream observations, was frequently swung rapidly through an arc of 60°, and as rapidly back again, during the strength of the stream.

(*d*) There are also eddies and swirls between West St. John island and Pulau Tekukor, and between Pulau Tekukor and Pulau Blakang Mati.

(*e*) The east-going stream is not strong northward of East St. John and Peak islands where there may be eddies during the strength of this stream.

Chart 2023.

(*f*) In Selat Sengkir there are swirls and eddies at the eastern entrance and on the spit extending from the Military pier.

(*g*) In Keppel harbour the east-going stream runs strongly and causes somewhat dangerous swirls and eddies; there are eddies close to Telegraph wharf, close eastward of Chermin bay and at both ends of Section X of the Singapore Harbour Board's wharves.

It was reported, in 1934, that the east-going stream sets on to King's Dock wharf immediately eastward of King's dock. The west-going stream causes an offset.

It was reported, in 1935, that the west-going stream is greatly accelerated at Section VIII of the Singapore Harbour Board's wharves, due to the line of the wharves acting as a training wall.

The west-going stream runs with great strength between the western entrance points, where the rate may reach 4 knots; it is weak along the Harbour Board's wharves from the Albert and Victoria docks as far as the West wharf, but increases thence towards the western entrance, and is hardly felt along the wharf at Pulau Brani; there is, during this stream, slack water on the western side of Tanjong Pagar (*Lat. 1° 16′ N., Long. 103° 51′ E.*); this should be remembered when approaching the docks, for, if not guarded against, with the bow in slack water and a strong stream on the quarter, an awkward sheer might be experienced.

KEPPEL HARBOUR.—Keppel harbour, between Singapore island on the north and Pulau Blakang Mati and Pulau Brani on the south, has a least width of 1½ cables.

Situated as it is in the very centre of Eastern commerce, Keppel harbour possesses extensive dock and wharf accommodation, the property of the Singapore Harbour Board. There is a large basin fitted with all modern appliances, and several dry docks.

The whole of the above establishments are situated on the northern side of Keppel harbour.

About one mile north-eastward of Kubu Batu Belayar is Mount Faber, a prominent range of hills which rises boldly from the northern shore of the harbour; its highest point, with an elevation of 347 feet (105^{m}8), is towards the north-western end.

Caution.—Vessels berthing in Keppel harbour are cautioned that the wharves and certain other specified areas within the port are Protected Areas. Entry into these areas is subject to special regulations which should be obtained on arrival.

Charts 2403, 795, 2757, 3543, 1355, 2660a, 941a, 1263.

Chart 2023.

Depths.—The harbour, and both entrances to it, are sufficiently deep for all classes of vessels, and there are depths of from 18 to 33 feet ($5^{m}5$ to $10^{m}1$) alongside the wharves at low water.

As an anchorage, Keppel harbour is indifferent, but vessels are not permitted to anchor in it except under special circumstances. *See* Appendix I.

The western entrance is one cable wide between the 6-fathom ($11^{m}0$) lines off Kubu Batu Belayar and Tanjong Rimau, and has a least depth of 39 feet ($11^{m}9$) in the fairway.

The eastern entrance lies between Tanjong Pagar and Teregeh spit, where it is about 4½ cables wide. There are three channels in the eastern entrance: North channel, with a least depth of 28 feet ($8^{m}5$); Middle channel, 24 feet ($7^{m}3$); and South channel, 18 feet ($5^{m}5$).

Both sides of the harbour, except in places where wharves have been built out, are fringed with reefs which dry, but close to their edges there are usually depths of from 3 to 4 fathoms ($5^{m}5$ to $7^{m}3$), increasing suddenly to 5 and 6 fathoms ($9^{m}1$ to $11^{m}0$).

Western end of Keppel harbour.—Dangers.—Beacons.—Buoyage.—Kubu Batu Belayar, the northern entrance point, is formed of cliffs, 60 feet ($18^{m}3$) high.

North-westward of the point the cliffy coast is backed by a ridge of densely-wooded hills, and is bordered by a white beach named Pasir Panjang, which is fringed by a reef which extends half a cable offshore. The coast farther north-westward has been described on page 180.

A white stone beacon, No. 8, surmounted by a staff and cage, is situated on the southern edge of the reef which extends from the point, and the 6-fathom ($11^{m}0$) line lies about a quarter of a cable farther southward. About a quarter of a cable north-westward of the point is a white obelisk.

For light and signal station on Kubu Batu Belayar, *see* pages 182 and 198, respectively.

Belayar rock (*Lat. 1° 16′ N., Long. 103° 48′ E.*), with a depth of 6 feet ($1^{m}8$), lies half a cable west-south-westward of Kubu Batu Belayar, and is steep-to on its southern side.

A patch, with a depth of 16 feet ($4^{m}9$), lies 2¾ cables westward of Kubu Batu Belayar, and is the shoalest part of a ridge, with depths of less than 6 fathoms ($11^{m}0$), which extends north-westward about parallel with the coast at a distance of from 3 to 4 cables.

About 3 cables north-eastward of Kubu Batu Belayar is Bukit Chermin, a wooded hill, 160 feet ($48^{m}8$) high, with a house on its summit. Close south-westward of the hill is the entrance to Belayar canal, which trends north-westward, and reclamation was in progress in 1939.

Tanjong Rimau, the southern entrance point of Keppel harbour, is cliffy with projecting patches of shelving rock. The fringing reef extends about 70 yards ($64^{m}0$) westward from the point.

Chermin bay is a bight in the coast on the eastern side of Bukit Chermin. Close eastward of the bay is the Keppel harbour section of the Singapore Harbour Board's wharves, which includes Nos. 1 and 2 docks, and King's dock. There are landing steps on both sides of the entrance to King's dock. For depths alongside these wharves, *see* page 198.

Charts 3837, 3833, 2403, 795, 2757, 3543, 1355.

Chart 2023.

Hantu, a densely wooded island, 133 feet ($40^{m}5$) high, lies fronting Chermin bay. A reef fringes the island and extends half a cable from its south-western side, but only a short distance from the north-eastern side. The channel between the island and the entrance to Nos. 1 and 2 docks is about three-quarters of a cable wide, with depths of from 16 to 39 feet ($4^{m}9$ to $11^{m}9$).

The edge of the fringing reef on the southern side of Hantu is marked by a white stone beacon, No. 10, surmounted by a staff and ball.

Pulau Renggis lies on a reef covered with mangroves, the tops of which are about 18 feet ($5^{m}5$) high; it is situated about half a mile eastward of Tanjong Rimau and half a cable from the southern shore. The reef, which dries, extends about half a cable westward and a quarter of a cable eastward, with a 10-foot ($3^{m}0$) patch about half a cable beyond the eastern part.

Selegu island, 86 feet ($26^{m}2$) high, and wooded, with a building on its summit, lies about 1½ cables eastward of Pulau Renggis. There is a stone pier on the north-eastern side. The island fronts Imbiah bay, to the shores of which it is connected by a coral reef which dries.

Telok Blanga, encumbered with reef which dries about 3 feet ($0^{m}9$), lies on the northern side of the harbour, between King's dock and the western end of Section X of the Singapore Harbour Board's wharves.

A 30-foot ($9^{m}1$) patch lies just within the 6-fathom ($11^{m}0$) line fronting the northern shore, about half a cable south-south-westward of the western end of Section X of the Singapore Harbour Board's wharves.

Mæander shoal (*Lat. 1° 16′ N., Long. 103° 49′ E.*), with a least depth of 9 feet ($2^{m}7$), lies nearly 1½ cables south-south-eastward of the western end of Section X of the Singapore Harbour Board's wharves.

A light-buoy, exhibiting a *green flashing* light *every three seconds*, is moored about three-quarters of a cable westward of the shoalest part of Mæander shoal.

The channel southward of Mæander shoal has a least depth of 22 feet ($6^{m}7$).

About three-quarters of a cable north-north-eastward of the eastern end of Section X of the Singapore Harbour Board's wharves is St. James' power station, a very noticeable red brick building. Close westward of this station is St. James' hill, 50 feet ($15^{m}2$) high.

Current indicator.—A floating current indicator with a wooden arrow, is moored on the northern side of Mæander shoal.

Pulau Brani.—Beacons.—Pulau Brani has three hills on its eastern side; the middle one, which is the highest, has an elevation of 157 feet ($47^{m}8$), and is covered with trees. The southern side of the island forms the northern shore of Selat Sengkir.

Tanjong Risim, the western point of the island, is fringed by a coral reef with occasional patches of sand, which dry about 3 feet ($0^{m}9$); the reef, which extends about 1¾ cables westward from the point, is marked at its extremity by a white stone beacon, No. 24, surmounted by a diamond and ball.

The north-western side of Pulau Brani, between Tanjong Risim and Tanjong Tereh, the northern extremity, is fringed by reef for 1¾ cables eastward of the former point, where it terminates abreast Kampong Brani, which has been built over the reclaimed portion of Saga bay.

There is a pier extending to a little beyond low water mark from

Charts 3837, 3833, 2403, 795, 2757, 3543, 1355.

Chart 2023.

Tanjong Risim, with a boat shed and slip close eastward of it. At the north-eastern edge of the cliff, about one cable north-eastward of the pier, is a notice-board, marking the submarine cable from the northern shore.

Tanjong Tereh is a cliffy point rising within to an elevation of 94 feet ($28^{\mathrm{m}}7$), with many buildings on its grassy slopes. It is a bold red bluff, which is noticeable when viewed from either entrance to the harbour. From Tanjong Tereh the cliff continues all along the east coast of the island indented in places by sandy coves, to which the tide only reaches towards high water.

Brani reef, commencing at Tanjong Tereh, fringes the eastern side of the island, extending a distance of 2¼ cables eastward from Tanjong Teregeh, the south-eastern extremity of the island. It is formed of flat rough coral with occasional patches of sand, and dries about 4 feet ($1^{\mathrm{m}}2$).

Teregeh spit, the extremity of the reef, extending from the eastern side of Pulau Brani, is marked by a white stone beacon, No. 18, surmounted by a ball.

Signal stations.—A signal station is situated on Kubu Batu Belayar (*Lat. 1° 16′ N., Long. 103° 48′ E.*). The station, which is only used during daylight hours, repeats the berthing signals shown from the signal station near the north-western end of East wharf. *See* page 200.

Time signal.—Time signals are made by day from the observatory on Mount Faber and from the roof of Fullerton building near the Master Attendant's pier, *see* page 205.

Prohibited anchorage.—On account of the existence of submarine cables, anchorage is prohibited in the area shown by pecked lines on the chart northward of the western extremity of Pulau Brani. *See* Appendix I.

Wharves.—Near the western end of Keppel harbour, northward of Hantu island, is Telegraph wharf, with a depth of 18 feet ($5^{\mathrm{m}}5$) alongside, but reported to be silting. About three-quarters of a cable south-eastward of Telegraph wharf is the Dockyard Main wharf (Keppel Harbour wharves), with a depth of 24 feet ($7^{\mathrm{m}}3$). Between these two wharves are the entrances to Nos. 1 and 2 docks. King's Dock wharf, with a depth of 30 feet ($9^{\mathrm{m}}1$), lies about half a cable eastward of Dockyard Main wharf, with the entrance to King's dock between. Water-boat pier extends southward from the head of Telok Blanga, and was reported, in 1944, to have a depth of 10 feet ($3^{\mathrm{m}}0$) at its head. Jardine's steps are situated close eastward of the head of Water-boat pier.

From Jardine's steps to Tanjong Pagar, a distance of about 2 miles, the northern shore is occupied by the Singapore Harbour Board's wharves. Vessels proceeding alongside these wharves are signalled from the signal stations near the western end of East wharf and at Kubu Batu Belayar, as to which sections of the wharves they are to proceed. For this purpose the wharves are divided into ten sections numbered from eastward.

Section X, westward of St. James', has a depth of 32 feet ($9^{\mathrm{m}}8$) alongside. The Brani ferry runs from the steps adjacent to the western end of this wharf.

Section IX, opposite and eastward of St. James', has a depth of 32 feet ($9^{\mathrm{m}}8$) alongside.

Charts 3837, 3833, 2403, 795, 2757, 3543, 1355, 2660a, 941a, 1263.

Chart 2023.

Section VIII, West wharf, has extensive godowns, coal sheds and stores backing it; there is an installation for the shipment of palm oil in bulk; depth alongside, 33 feet (10^{m}1).

Section VII, Empire dock, has an entrance 150 feet (45^{m}7) wide, and a depth of 30 feet (9^{m}1). The Federated Malay States railway station is situated close northward of the dock.

Sections VI, V, and IV, Main wharf, has a least depth of 33 feet (10^{m}1) alongside.

Section III, Sheers wharf and the Victoria and Albert docks, with depths alongside Sheers wharf of 25 feet (7^{m}6).

Section II, East wharf, at the northern side of the entrance to the harbour, has a depth of 27 feet (8^{m}2) alongside.

Section I, East lagoon, comprises the area northward of East wharf and westward of the line of sunken hulks. The depth on the northern side of East wharf is from 18 to 24 feet (5^{m}5 to 7^{m}3), and in the approach from 17 to 18 feet (5^{m}2 to 5^{m}5).

Eastern entrance to Keppel harbour.—Lights.—Dangers.—Beacons.—Buoys.—The eastern entrance is divided into three channels by Tembaga rocks and Brani shoals. For depths in these channels, *see* page 196.

Brani shoals separate Middle channel from South channel, between Tanjong Pagar and Pulau Brani, and within a depth of 3 fathoms (5^{m}5), extend half a mile in the direction of the channel; depths of 30 feet (9^{m}1) and less extend about 1¼ cables westward and nearly three-quarters of a cable northward from the north-western end of the shoal, as defined by the 3-fathom (5^{m}5) line. The least depth on these shoals is 12 feet (3^{m}7), situated about the middle. Brani shoals are marked by three white conical buoys, each surmounted by a ball, one being moored at the north-western end, and one on either side.

At the south-eastern end of South channel there is a shoal, with a depth of 18 feet (5^{m}5), about 1¼ cables north-eastward of the eastern extremity of Teregeh spit, and is marked on its north-eastern side by a black conical buoy, surmounted by a ball.

A black conical buoy, surmounted by a ball, is moored on the south-western side of South channel, 2½ cables eastward of Tanjong Tereh (*Lat. 1° 16′ N., Long. 103° 50′ E.*).

Too much dependence must not be placed on the buoys maintaining their charted positions; they are re-moored when necessary.

At the north-western end of South channel depths of less than 6 fathoms (11^{m}0) extend over one cable north-north-eastward from the northern side of Pulau Brani.

Tembaga rock, which dries in patches, lies between Section IV of the Singapore Harbour Board's wharves and Brani shoals, and separates North channel from Middle channel. The south-eastern end is marked by a red stone beacon, surmounted by a ball, and the north-western end by a similar beacon, from which a light is exhibited.

A detached 17-foot (5^{m}2) patch lies nearly three-quarters of a cable north-westward of Tembaga rock light-beacon, and close north-westward of it is moored a red conical buoy surmounted by a ball.

A light is exhibited, at an elevation of 33 feet (10^{m}1), from a red iron structure, on the southern extremity of the sunken hulks, about 1½ cables south-eastward of Tanjong Pagar.

Obstruction.—Buoys.—An obstruction exists on Brani shoals

Charts 3837, 3833, 2403, 795, 2757, 3543, 1355.

Chart 2023.

about 2 cables southward of the light-beacon on the north-western end of Tembaga rock; it is marked close on its eastern and western sides by a red conical buoy.

Tide gauge.—There is a self-registering tide gauge situated in a hut on the western side of Victoria dock entrance.

Selat Sengkir. — Dangers. — Beacons. — Obstructions. — Selat Sengkir, the channel between the northern side of Pulau Blakang Mati and Pulau Brani, has a least depth of 15 feet ($4^{m}6$) in the fairway, and is navigable for small vessels, but owing to the gusts of wind caused by the adjacent high land, it can scarcely be considered safe for sailing vessels.

The eastern entrance to Selat Sengkir is closed by obstructions.

On the southern side of Pulau Brani, about a quarter of a mile from the western extremity, are some tin smelting works, with a wharf, 150 feet ($45^{m}7$) long, having a depth of 18 feet ($5^{m}5$) alongside.

A bank, with depths of less than 18 feet ($5^{m}5$), extends 3 cables east-south-eastward from a position on the edge of the drying reef one cable southward of Tanjong Risim. On the north-western part of this bank is a reef, the southern extremity of which is marked by a white stone beacon, No. 22, surmounted by a ball.

A bank, with depths of from 15 to 18 feet ($4^{m}6$ to $5^{m}5$), lies three-quarters of a cable north-north-westward of the head of the pier situated on the northern side of Pulau Blakang Mati, 3¾ cables westward of Tanjong Berhala, and a detached 15-foot ($4^{m}6$) patch lies close southward of this bank.

A white stone beacon, No. 20, surmounted by a ball, marks the edge of the reef extending half a cable south-south-eastward from Tanjong Teregeh.

A red stone beacon, No. 16, surmounted by a ball, marks the northern edge of the reef extending northward from Tanjong Berhala (*Lat. 1° 15′ N., Long. 103° 50′ E.*).

No. 18 beacon marking the edge of Teregeh spit, and No. 14 beacon marking the extremity of Berhala spit, have been described on pages 198 and 193, respectively.

Mooring buoys.—There are some red mooring buoys on the northern side of the channel in Selat Sengkir, northward of the pier, the positions of which may best be seen on the chart.

Submarine cables.—Submarine cables, the positions of which can best be seen on the chart, cross Selat Sengkir at points about 1¾ cables eastward of No. 24 beacon and about 1½ cables westward of No. 20 beacon; vessels are prohibited from anchoring in the vicinity of these cables.

Traffic and berthing signals.—Traffic signals, which are repeated at Kubu Batu Belayar, are made by semaphore arms at the signal station, situated near the north-western end of East wharf, as follows:—

South arm up indicates that a vessel is leaving the Empire dock.

North arm up indicates that a vessel is leaving King's dock.

Both arms raised to form a V indicate that one or more vessels exceeding 75 tons are in Keppel harbour channel, bound westward, between the entrance to Empire dock and Kubu Batu Belayar. As soon as the channel is clear the arms will be lowered.

A red ball at the masthead indicates that a vessel is entering or leaving the Victoria or Albert docks.

Charts 1995, 3837, 3833, 2403, 795, 2757, 3543, 1355.

Chart 2023.

Vessels turning in Keppel harbour channel should display the answering pendant of the International Code of Signals at the triatic or jumper stay.

Large black figures are displayed at the yard-arms of the flagstaff, indicating the number of the wharf allotted to the vessel denoted.

When a vessel is entering the harbour from westward, the number of the wharf assigned will be displayed at the northern yard-arm; if entering from eastward, from the southern yard-arm; when more vessels than one are entering, from either direction, numbers are added below the upper number, and correspond to the order in which the vessels shall enter, *i.e.* the vessel ahead follows the direction given by the upper number, and so on. When the berth is not clear for a vessel to go alongside, a black ball is displayed at either yard-arm in place of a number, its position denoting the vessel signalled, which vessel must remain outside until the number of the wharf is made.

An anchor displayed at either yard-arm denotes, by its position, that the vessel indicated should anchor outside, no wharf accommodation being available at the time.

Flag N of the International Code of Signals will be shown on the wharf at the berth the vessel is to occupy.

The following berthing signals are made at night :—

Two *white* lights, vertically disposed, indicates that the vessel should proceed to her berth as arranged.

A *red* light over a *white* light indicates that the vessel should wait, as her berth is not clear.

Two *red* lights, vertically disposed, indicates that there is no berth available, and the vessel should proceed to the anchorage.

A *red* light will be exhibited on the wharf at the berth the vessel is to occupy.

Directions.—Although there is no difficulty in piloting vessels into or through Keppel harbour, or alongside any of the wharves, strangers are recommended to employ pilots, as the space is limited and the tidal streams are strong. It has been sometimes necessary for vessels to go right through the harbour and turn outside.

For directions for vessels approaching Keppel harbour from westward through Selat Sinki, *see* page 183.

Western entrance.—Vessels proceeding into Keppel harbour through the western entrance should keep in mid-channel.

Chart 3837.

Approaching the western entrance of Keppel harbour, from southward, the channel between the Sisters and Pulau Sebarok (*Lat. 1° 12′ N., Long. 103° 48′ E.*) is recommended. Between the 5-fathom ($9^{m}1$) shoal nearly one mile westward of the Sisters and the reef marked by a red conical buoy south-eastward of Pulau Sebarok, the channel is about one mile wide. Pulau Jong, bearing 304°, kept well open north-eastward of Pulau Sebarok, leads north-eastward of the reef.

Eastward of the Sisters, and between them and West St. John island, is a deep channel about half a mile wide.

Chart 1995.

Eastern entrance.—A vessel approaching the eastern entrance from south-eastward, from a position a quarter of a mile eastward of Peak island, should keep the clock tower on Telok Ayer fish market in line with Fort Canning lighthouse, bearing 345°; when the signal

Charts 3837, 3833, 2403, 795, 2757, 3453, 1355.

Chart 1995.

station flagstaff on the south-eastern slope of Mount Faber bears 287°, she should steer for it on that bearing.

A vessel proceeding from Singapore road into Keppel harbour should steer south-westward, altering course westward when the signal station flagstaff on the south-eastern slope of Mount Faber is well open southward of East wharf, bearing 287°, which leads to the entrance of North and Middle channels, and about three-quarters of a cable southward of East wharf.

Chart 2023.

To proceed through North channel, which is the best for vessels of deep draught, having steered for the signal station flagstaff on the south-eastern slope of Mount Faber on the bearing given above, when abreast East wharf the vessel should steer for a position midway between Tembaga rock and the wharves, and thence to the wharf appointed by signal.

If proceeding through Middle channel, the vessel should continue on the alignment mentioned above until the south-eastern beacon marking Tembaga rock is abeam, when she should edge northward to pass over the northern tail of Brani shoals, in a least depth of 23 feet ($7^{m}0$).

To proceed through South channel the vessel should steer for Tanjong Selensing, the north-eastern extremity of Pulau Brani, bearing 281°, which will lead between the south-eastern extremity of Brani shoals and the black conical buoy marking the 18-foot ($5^{m}5$) patch about 1¼ cables north-north-eastward of Teregeh spit beacon, No. 18, in a least depth of 29 feet ($8^{m}8$); thence she should alter course north-westward and keep in the middle of the fairway, passing about half a cable south-westward of the white conical buoy marking the south-western edge of Brani shoals, and thence between the black and white buoys at the north-western end of the channel, when course may be altered for the appointed wharf.

Harbour facilities.—Large quantities of coal and fuel-oil are maintained. Vessels can be coaled at the rate of 100 tons per hour. Numerous lighters are available.

Provisions of all kinds may be obtained. Water is laid on to the wharves.

There are several tugs available. Two salvage vessels are maintained by the Singapore Harbour Board.

There are 5 docks and 5 patent slips; for the dimensions of the largest dock, *see* Appendix III.

At the Dockyard Main wharf there is a 15-ton crane. On Section VIII of the Main wharf there is one 3-ton crane and one 6-ton. On Sections IV, V and VI of the Main wharf there are four travelling cranes, including one of 15 tons, one of 4 tons, and two of 2 tons. Repairs to hulls, engines, and boilers can be effected by the Harbour Board.

Chart 1995.

SINGAPORE ROAD.—**Lights.**—**Dangers.**—**Buoys.**—Singapore road lies eastward of Keppel harbour, its approach being between St. John islands and Siglap obelisk (*Lat. 1° 18′ N., Long. 103° 55′ E.*), about 5½ miles north-eastward. At the head of the bay is the city of Singapore with Singapore river, and about one mile farther north-eastward, Kalang and Gelang rivers, which discharge westward of

Charts 3837, 3833, 2403, 795, 2757, 3543, 1355.

Chart 1995.

Tanjong Ru. Depths of less than 3 fathoms ($5^{m}5$) extend for about three-quarters of a mile seaward of the Detached mole.

In the eastern part south-westward and southward of Tanjong Katong, there are several detached patches, with depths of from 3 to 18 feet ($0^{m}9$ to $5^{m}5$).

Outer shoal, over which there is a least depth of 20 feet ($6^{m}1$) at the south-western end, extends in a north-easterly direction for about 2 miles from a position about 1½ miles south-eastward of Tanjong Pagar, with depths of less than 36 feet ($11^{m}0$), mud, sand, and shells.

Between the south-western end of Outer shoal and the reef extending north-eastward from Pulau Seringat, there is a shoal, with depths of from 27 to 36 feet ($8^{m}2$ to $11^{m}0$). The clock tower at Telok Ayer fish market in line with Fort Canning lighthouse (*see* below), bearing 345°, leads over the western part of this shoal, but westward of Outer shoal. This shoal and the south-western part of Outer shoal are covered by the *red* sector of Fort Canning light, between the bearings of 336° and 349°. The whole of Fort Canning hill, bearing about 298°, open north-eastward of the Victoria Memorial hall, leads north-eastward of Outer shoal. The shoals farther westward are described on page 192.

A light is exhibited, at an elevation of 39 feet ($11^{m}9$), from a white concrete beacon with red bands, at the south-western end of Outer shoal.

A light (*Lat. 1° 18′ N., Long. 103° 51′ E.*) is exhibited, at an elevation of 202 feet ($61^{m}6$), from a white iron tower, on Fort Canning, 1¾ miles northward of Tanjong Pagar.

A white conical buoy is moored about 5¼ cables eastward of the southern end of the Detached mole.

Port limits.—The boundaries of the port of Singapore are defined as follows :—

From Siglap obelisk, in a straight line to the white obelisk on Peak island, thence along the southern coast of that island to its south-western point, thence to the southern point of East St. John island, thence to the southern point of West St. John island, thence to the southern point of Pulau Sebarok, thence due west until it meets a line drawn north and south through the western beacon on Cyrene reef until it meets the island of Singapore, thence eastward along the coasts of that island to Siglap obelisk including Singapore river as far as Kim Seng bridge, Rochore river as far as Victoria bridge, Sungei Kalang as far as the iron bridge, and Sungei Gelang as far as the Police station, and all piers, jetties, &c., within these limits, and (subject to rights of private property) all portions of the shore within 50 yards ($45^{m}7$) of high water mark.

Port regulations.—*See* Appendix I.

Charts 2023, 1995.

Western and northern shores.—Beacon.—Buoys.—Between Tanjong Pagar and a point about 6 cables north-north-eastward, the western shore is fringed by a bank with depths of less than 3 fathoms ($5^{m}5$), and a tongue with similar depths extends about half a mile north-eastward from the south-eastern extremity of East wharf ; it is marked on the inner side of its outer end by a red conical buoy, and on its eastern edge, about 3¾ cables east-north-eastward of the south-eastern extremity of East wharf, by a white conical buoy.

Charts 3833, 2403, 795, 2757, 3543, 1355.

Charts 2023, 1995.

On the shallow ground eastward of Tanjong Pagar are several sunken hulks. For light on the southernmost hulk, *see* page 199.

Malay spit, which dries from one to 6 feet ($0^{m}3$ to $1^{m}8$), extends about a quarter of a mile offshore about 4 cables north-eastward of Tanjong Pagar. On the reclaimed land on the south-western side of the spit are the incinerator chimney, numerous godowns, and other buildings.

White conical buoys are moored about 1¼ cables southward and about three-quarters of a cable eastward of the drying edge of Malay spit.

Chart 1995.

Telok Ayer is a basin, situated with its southern end about three-quarters of a mile north-north-eastward of Tanjong Pagar; it is dredged to a depth of 7 feet ($2^{m}1$), and is used by small craft. It is formed by two arms, named North and South piers, alongside the outer sides of which there is a depth of 15 feet ($4^{m}6$), but less water was reported in 1944; close southward of the basin are the Palmer godowns, which are conspicuous, and near the northern end is the clock tower of the Telok Ayer fish market. For conspicuous buildings farther northward, *see* page 207 and view facing page 208.

The Royal Naval Volunteer Reserve drill ship *Laburnum* is berthed on the seaward side of the head of South pier at Telok Ayer; she is secured to mooring buoys head and stern. Vessels anchoring in this vicinity must do so in such a manner as to swing at least 30 feet ($9^{m}1$) clear of the buoys.

The entrance to Singapore river is fronted by a flat, with depths of less than 6 feet ($1^{m}8$), extending 2¼ cables offshore. The river is spanned by several bridges, the lower one, at the mouth, being Anderson bridge, and the next above it, Cavanagh bridge. The river is always congested with cargo boats, but the central part is kept dredged and clear for traffic.

Tanjong Ru (*Lat. 1° 18′ N., Long. 103° 52′ E.*), about one mile north-eastward of the entrance to Singapore river, is the western extremity of a peninsula which, with Tanjong Katong about 1½ miles eastward of it, forms the northern shore of Singapore road.

Tanjong Katong is low, and covered with coconut palms and bungalows; the Seaview hotel, close eastward of the point, is conspicuous. On the coastline in the vicinity are numerous bathing enclosures. Fishing stakes extend offshore nearly to the 6-fathom ($11^{m}0$) line. There is a small iron pier on the point.

Chart 3838.

A white beacon, known as Siglap obelisk, stands near the low water mark about 1¼ miles east-north-eastward of Tanjong Katong.

Chart 1995.

Detached mole. — Lights. — Beacons. — A rubble breakwater, known as the Detached mole, fronts the city of Singapore southward of Singapore river. Two beacons stand on the mole; the northern beacon, No. 1, painted in black and white bands, is surmounted by a disc; the southern beacon, No. 2, painted in red and white bands, is surmounted by a triangle.

A light is exhibited, at an elevation of 33 feet ($10^{m}1$), from a white tower, 24 feet ($7^{m}3$) in height, at each end of the Detached mole.

Inner harbour.—Piers.—Lights.—The space between the De-

Charts 3838, 3833, 2403, 795, 2757, 3543, 1355.

tached mole and the shore westward of it is known as the Inner harbour; it has depths of from 14 to 19 feet ($4^{m}3$ to $5^{m}8$), and affords anchorage for small vessels, but they must not anchor within a distance of 2 cables of the extremities of the mole.

A red mooring buoy for the use of the Government yacht, lies in the northern approach to the Inner harbour.

Clifford pier, with a depth of about 4½ feet ($1^{m}4$) at its head, is situated westward of the northern end of the Detached mole. A light is exhibited from each end of the head of the pier. About 1½ cables northward of Clifford pier is the Master Attendant's pier, from the head of which a light is exhibited.

A light is exhibited on the southern entrance point of Singapore river.

Airport. — Lights. — Beacon. — Light-buoys. — Northward of Tanjong Ru is Kalang airport, with an approach channel and anchorage for seaplanes, dredged, in 1937, to a depth of 6 feet ($1^{m}8$).

A light is exhibited from the control tower of the aerodrome when land aircraft are expected to arrive at night.

A light is exhibited from a concrete beacon on each side of the entrance to the approach channel; in addition, when seaplanes are expected to arrive, two black balls, by day, and two *red* lights, disposed vertically, at night, are shown from a mast on the beacon on the western side of the entrance.

The anchorage and the approach channel for seaplanes is marked by light-buoys.

A red framework beacon, No. 27, surmounted by a ball, is situated about 2 cables westward of Tanjong Ru (*Lat. 1° 18′ N., Long. 103° 52′ E.*) and marks the edge of the drying bank of mud and sand extending from that point.

Surface vessels are not permitted to use the entrance channel to the airport when the movements of aircraft are taking place but, at other times, small craft will be allowed free passage; gates, provided for the use of such craft, will normally remain open and will be closed only when the channel is required for use by aircraft.

Anchorage in the approach channel is prohibited at all times.

Prohibited anchorages.—Anchorage is prohibited in the area indicated by pecked lines on the chart south-eastward of the entrance to Sungei Gelang, and in the vicinity of the submarine cable trending southward from Tanjong Katong.

Signal station.—There is a Government signal station at Fort Canning, from which the approach of all vessels is signalled, and local signals displayed; the description of the latter can be obtained from the Master Attendant's office, near the entrance to the river.

Messages will be received and transmitted through Lloyd's.

Bells for the use of shipping are fitted at the Registry of Shipping, Master Attendant's office and at the Wharf Superintendent's Office, Tanjong Pagar. These bells are electrically connected to the Observatory standard clock, and ring automatically at every hour of Greenwich mean time. Chronometers may be compared by applying at the Wharf Superintendent's office.

Anchorages.—Vessels of deep draught may obtain good anchorage in Singapore road between the north-western side of Outer shoal and the 6-fathom ($11^{m}0$) line off the town, with Fort Canning lighthouse

Chart 1995.

bearing between 310° and 338°, in depths of from 7 to 12 fathoms ($12^{m}8$ to $21^{m}9$), mud and sand.

Small vessels may run in guided by the soundings and anchor where they can find a convenient berth, or proceed into the Inner harbour. Inside the 6-fathom ($11^{m}0$) line the depths shoal somewhat abruptly in most places, requiring caution when approaching the anchorage.

Heavy squalls during the South-west monsoon occasionally impede coaling in Singapore road.

For Man-of-War anchorage, *see* Appendix I.

The limits of the Prohibited anchorage, Eastern Explosives anchorage, and Quarantine anchorage in Singapore road are shown by pecked lines on chart 1995, and are given in Appendix I.

The anchorage for junks and Asiatic craft is south-westward of Tanjong Ru (*Lat. 1° 18′ N., Long. 103° 52′ E.*); the limits are given in Appendix I.

A coal hulk, *Oscar II*, is moored in the Eastern Explosives anchorage, about 2 miles east-south-eastward of the northern end of the Detached mole.

For Quarantine anchorage during the North-east monsoon, *see* page 193.

Berthing arrangements.—Steamers berthing in the Inner harbour are to anchor in the following areas:—

(*a*) Steamers not exceeding 230 feet ($70^{m}1$) in length will lie northward of an imaginary line drawn at right-angles to the shore (i.e. in a 293° direction), from No. 1 beacon.

(*b*) Steamers exceeding 230 feet ($70^{m}1$) in length and not exceeding 275 feet ($83^{m}8$) will anchor southward of a line drawn at right-angles to the shore from No. 1 beacon and northward of an imaginary line drawn at right-angles to the shore (i.e. in a 293° direction) from No. 2 beacon.

(*c*) Steamers exceeding 275 feet ($83^{m}8$) in length, but not exceeding 315 feet ($96^{m}0$), will anchor southward of an imaginary line drawn at right angles to the shore from No. 2 beacon.

(*d*) Steamers exceeding 315 feet ($96^{m}0$) in length will lie in the Outer road north-eastward of the northern end of the Detached mole.

(*e*) Local colliers will anchor, except in bad weather, in the Outer road eastward of the southern end of the Detached mole.

(*f*) Steamers under 75 tons will anchor northward of a line drawn 090° from the entrance to Singapore river.

For the purposes of berthing at Singapore, the length of any steamer is that quoted in Lloyd's Annual register of Shipping.

Masters of steamers unable to find accommodation in their own area must anchor outside the Detached mole until a clear berth inside is available.

Signals from vessels in the roadstead.—The undermentioned signals should be made, when necessary, by vessels lying in the Inner harbour and Outer road:—

(*a*) Flag " A," of the International Code of Signals, when requiring fresh water lighters.

The signal " AA " should not be used for this purpose.

(*b*) Flags " AM," when medical or surgical assistance is required. If an accident occurs afloat this signal may be accompanied

Chart 1995.

by a series of short blasts on the whistle or siren in order to draw attention to the signal.

If possible a boat should be despatched to the Master Attendant's pier, where medical assistance, stretchers, and an ambulance can be summoned by telephone.

Directions.—*From westward.*—A vessel of deep draught bound to Singapore from westward, and having rounded Peak island at a distance of about a quarter of a mile, should keep the clock tower of Telok Ayer fish market in line with Fort Canning lighthouse, bearing 345°, until Tanjong China, the southern extremity of Pulau Blakang Mati bears less than 235°; this course leads over the western part of the shoal south-westward of Outer shoal, in a least depth of 34 feet ($10^{m}4$); then alter course north-eastward for the anchorage.

Vessels of shallow draught from abreast and eastward of Peak island may steer for Singapore road by passing over Outer shoal, which, except at the south-western end, has general depths of from 24 to 36 feet ($7^{m}3$ to $11^{m}0$).

From eastward.—A vessel of deep draught from eastward should pass between Tanjong Katong and the north-eastern end of Outer shoal, with Fort Canning lighthouse bearing 287°, and thence course may be altered for the anchorage.

Small vessels from eastward may steer direct for the anchorage in the Outer road or Inner harbour. Vessels of less than 15 feet ($4^{m}6$) draught may pass within the banks off Tanjong Katong (*Lat. 1° 18′ N., Long. 103° 54′ E.*) by keeping fairly close to the end of the lines of fishing stakes which extend out from that point, but taking care to avoid the shoal, with a depth of 3 feet ($0^{m}9$), lying about 6½ cables west-south-westward of that point.

Singapore.—The city of Singapore stands on each side of the Singapore river. The commercial part of the town is on the southern side, the banks on either side being lined with quays and godowns.

Singapore is a free port, there being no harbour or dock dues. Customs duties are levied on opium, alcoholic liquors, tobacco, and petroleum only.

Fullerton building, on the southern side of the entrance to the river, has a red roof, and is the largest and most conspicuous building on the water front. This building contains the General Post Office, the Master Attendant's and Shipping Offices, Chamber of Commerce, Singapore Club, and certain Government Offices. Other conspicuous objects in the vicinity are Ocean building with a high tower and green roof, Union tower, and Bank tower, all on the southern side of the river.

On the northern side is the Victoria Memorial hall, a yellow stone building, surmounted by a dome and clock tower, the clock being illuminated at night; the crown surmounting this building is 188 feet ($57^{m}3$) high. When the sun is shining on the clock tower, this building is most conspicuous.

From the open square in front of the Victoria Memorial hall a fine esplanade extends for a quarter of a mile along the sea front; behind this esplanade is situated the Recreation ground fronting the Municipal offices and St. Andrew's cathedral, which has a tower surmounted by a spire 214 feet ($65^{m}2$) high, and on the sea front the Cenotaph, which are all conspicuous.

Chart 1995.

Fort Canning hill, on the summit of which are the lighthouse and signal station, rises abruptly above the centre of the town. *See* view facing this page.

There is a Sailors' Institute in Anson road.

The population of the city, in 1940, was 748,956.

Shipping.—*See* page 10.

Communication.—There is regular communication by steamer with all parts of the world, and there are frequent local services to the ports of the Straits Settlements and Malay States.

There is railway communication with Woodlands on the southern side of Johore strait, thence by a causeway to Johore Bahru, where it connects with the general system of the Malay peninsula. There is direct railway communication from Tanjong Pagar Docks station with Kuala Lumpur, Penang and Bangkok.

There is an air mail service between Singapore and Europe and to Batavia, via Palembang.

Radio station.—There is a radio station at Singapore, *see* page 16.

Hospitals.—There is a hospital to which seamen are admitted. The hospital for contagious diseases is on West St. John island.

Deratisation.—*See* page 17.

Weather.—Weather reports giving existing conditions at 0900 of wind and weather, together with the rainfall during the preceding 24 hours, at Singapore and other places in Southern Malaya, are posted up daily at the Shipping office in the Fullerton building.

Meteorological table.—*See* page 40.

Charts 3838, 3834, 3839.

EASTERN PART OF SINGAPORE STRAIT.—Northern shore.—The northern shore of the eastern part of Singapore strait is formed by the south-eastern part of Singapore island, Johore shoal and the south-eastern part of the Malay peninsula. Lima islands with several rocks and dangers near them, together with Remunia shoals, and Eastern bank, extend north-eastward from Tanjong Datok (*Lat. 1° 22′ N., Long. 104° 17′ E.*) nearly as far as the meridian of Tanjong Berakit on the opposite shore. These outlying dangers are described in detail on pages 217-219.

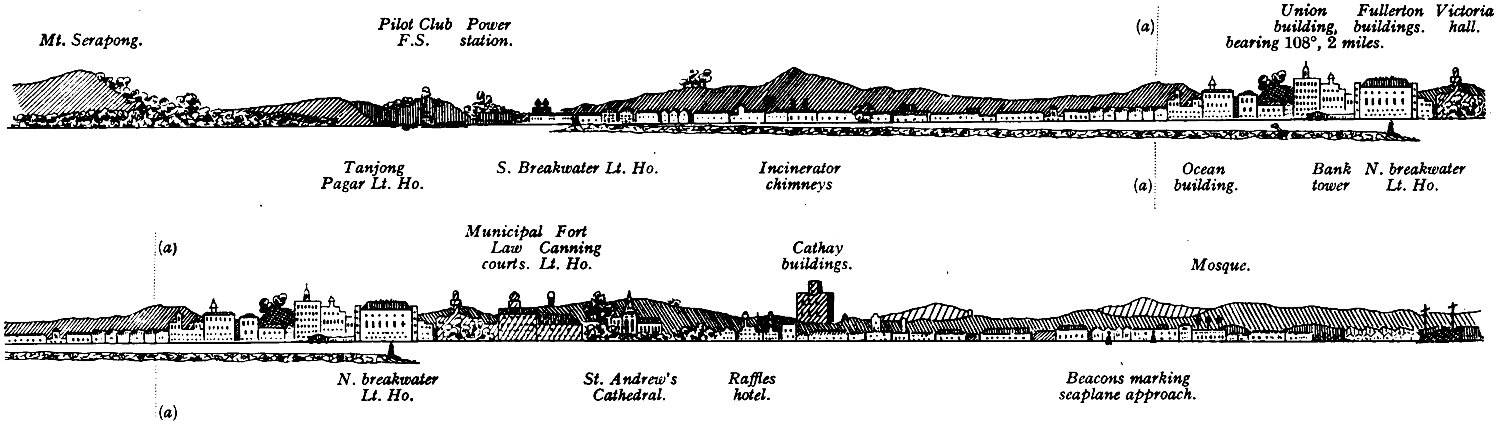
Chart 3838.

The coast between Tanjong Katong and Tanjong Bedok, about 4½ miles east-north-eastward, is generally sandy, and on it are numerous houses and villas. Tanah Merah kechil, about three-quarters of a mile westward of Tanjong Bedok, is now so much built over as to be practically indistinguishable from seaward. A bank, which dries from one to 4 feet (0^m3 to 1^m2), extends from 1½ to 3 cables offshore between these points; several rocky patches, which dry from one to 3 feet (0^m3 to 0^m9), lie on this bank south-westward of Tanjong Bedok. Fishing stakes extend nearly to the 5-fathom (9^m1) line along this coast.

Charts 2585, 3834.

Between Tanjong Bedok and Tanjong Changi, 4¼ miles north-north-eastward, the coast, with the exception of Tanah Merah besar, about midway between these points, where there are red cliffs, is low and sandy, and bordered with coconut palms and other vegetation, with occasional bungalows and numerous native huts close to the coast. Tanah Merah besar, on which are several bungalows, is visible for

To face page 208.


Mt. Serapong.
Pilot Club F.S.
Power station.
(a)
Union building, bearing 108°, 2 miles.
Fullerton buildings.
Victoria hall.
Tanjong Pagar Lt. Ho.
S. Breakwater Lt. Ho.
Incinerator chimneys
(a)
Ocean building.
Bank tower
N. breakwater Lt. Ho.
(a)
Municipal Law courts.
Fort Canning Lt. Ho.
Cathay buildings.
Mosque.
N. breakwater Lt. Ho.
St. Andrew's Cathedral.
Raffles hotel.
Beacons marking seaplane approach.
(a)

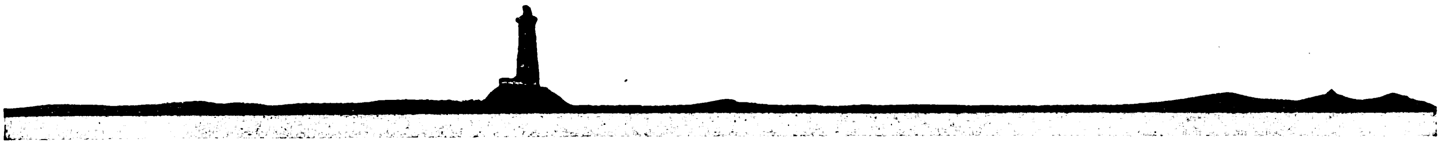
View, in two parts, of Singapore from eastward.

(*Original dated* 1946.)

Gunong Pelali, bearing 234°, 20 miles.
Bukit Twatow.

Hills on northern side of eastern approach to Singapore strait.

(*Original dated* 1902.)



Horsburgh lighthouse.

(*Original dated* 1902.)

Charts 2585, 3834.

a considerable distance from seaward. About three-quarters of a mile west-north-westward of it is a conspicuous prison tower, with a flagstaff. Tanjong Changi is a low point with a white sandy beach backed by coconut palms.

Between Tanjong Bedok and Tanjong Changi, Red Cliff bank and shoal, an extensive flat of mud and sand, with some patches of rock and coral on it, which dry from one to 2 feet ($0^{m}3$ to $0^{m}6$), extends with depths of less than 3 fathoms ($5^{m}5$) for 3¼ miles offshore. There are numerous fishing stakes on this flat.

Off-lying shoals.—Light-buoys.—Johore shoal, extending eastward from Red Cliff shoal, is composed of hard sand and has a least depth of 7 feet ($2^{m}1$) ; its eastern extremity, as defined by the 6-fathom ($11^{m}0$) line, lies about 6½ miles east-south-eastward of Tanah Merah besar. The eastern part of the shoal is steep-to on both its northern and southern sides.

The eastern end of Johore shoal is marked by a black can light-buoy, exhibiting a *white group flashing* light, showing a group of *two* flashes *every ten seconds*.

Pulau Mungging bearing 075°, just open of Tanjong Ayam, or at night, Fort Canning light bearing more than 270°, leads southward of Johore shoal (*Lat. 1° 19′ N., Long. 104° 03′ E.*).

Angler bank, over which there is a depth of 15 feet ($4^{m}6$), lies about 3½ miles eastward of Tanah Merah besar. A line of fishing stakes extends about one mile south-eastward from the shoalest part of the bank.

A light-buoy, painted black, exhibiting a *red group flashing* light, showing a group of *two* flashes *every ten seconds*, is moored about 5 cables north-eastward of the shoalest part of Angler bank.

Naval port.—Pilotage.—The limits of the Naval port are shown by pecked lines on charts 2585 and 3834.

Pilotage is compulsory for vessels other than those of less than 75 tons net registered tonnage, native sailing craft or H.M. ships within the limits of the Naval port. Vessels requiring pilots must give 12 hours' notice to the King's Harbour Master and must await the pilot in the vicinity of the Johore shoal light-buoy and southward of lat. 1° 19′ N.

Kuala Johore.—Islands and dangers.—Light.—Buoyage.—Beacons.—Kuala Johore is the area between the eastern side of Singapore island on the west, and Tanjong Pengelih or Johore, about 5½ miles eastward of Tanjong Changi, and Pulau Tekong besar on the east.

The navigable channel between the 6-fathom ($11^{m}0$) lines on either side, leading to the eastern entrance to Johore strait and to the entrance to Sungei Johore, is about 1¾ miles wide north-eastward of Johore shoal light-buoy, and one mile wide abreast Red Cliff bank ; farther north-westward, between the bank extending eastward from Pulau Ubin, and that extending westward from Pulau Tekong kechil, the channel is about half a mile wide. The least depth on the leading line is about 10 fathoms ($18^{m}3$).

Tanjong Pengelih is the termination of the slope of Bukit Pengerang or Johore hill, 8½ cables north-eastward. Eastward of the point the coast is low, with mangroves bordering it and coconut plantations inland ; northward of the point the land rises abruptly just inside the fringe of coconut palms which here border the coast.

Charts 3833, 2403, 795, 2757, 3543, 1355.

Charts 2585, 3834.

Bukit Pengerang, 605 feet (184^{m}4) high, and conspicuous, has been planted with rubber trees, but its summit is bare, except for a black and white survey beacon.

Malang Berdaun, a rocky islet, 2 feet (0^{m}6) high, lies about three-quarters of a mile south-eastward of Tanjong Pengelih, and just outside the drying bank, which here extends about 7 cables offshore.

A patch, which dries 7 feet (2^{m}1), lies 6½ cables southward of Tanjong Pengelih.

Chart 2585.

Pulau Tekong besar, 173 feet (52^{m}7) high, is considerably cultivated. From the southern side, a bank with depths of less than 3 fathoms (5^{m}5), named Fisherman bank, extends 1¾ miles ; this bank dries from one to 4 feet (0^{m}3 to 1^{m}2), from 2 to 8 cables offshore, and on it is Pulau Sejungkong, 60 feet (18^{m}3) high, lying off the middle of the southern side of the island. There are several fishing stakes situated on the outer edge of this bank. A red conical buoy and a black can buoy are moored about 1½ miles southward and 1½ miles south-westward, respectively, of Pulau Sejungkong.

Pulau Tekong kechil is separated from the western side of Pulau Tekong besar by Rajah Prang channel ; it is 147 feet (44^{m}8) high near the middle, but is low in its northern and western parts. A bank, which dries, extends about half a mile from the southern side of the island, and about 2 cables farther southward are two rocky islets, the western and larger of which is Pulau Sajahat, which is 55 feet (16^{m}8) high, and sparsely wooded ; it is conspicuous and easily identified by the grass on it, which shows up well under the trees.

A bank, with depths of less than 3 fathoms (5^{m}5), and on which are many rocks, sunken and above water, extends about 1½ miles south-eastward from Pulau Sajahat (*Lat. 1° 24′ N., Long. 104° 01′ E.*). Malang Tiga is a group of rocks on this bank, some of which are 2 feet (0^{m}6) high, and others dry from 3 to 6 feet (0^{m}9 to 1^{m}8) ; their positions can best be seen on the chart. The easternmost rock is marked by a conspicuous masonry beacon.

Two iron beacons mark a boat channel between the southern end of the bank which extends southward from Pulau Tekong kechil and Pulau Sajahat.

A red can buoy is moored about one cable eastward of Pulau Sajahat.

A 35-foot (10^{m}7) patch lies on the south-western side of the fairway, about 7 cables eastward of Tanjong Changi.

Two leading beacons are situated in Rajah Prang channel about 1¾ cables east-south-eastward of the south-eastern extremity of Pulau Tekong kechil ; in line, bearing 161°, they lead through the northern end of the fairway. The channel is marked by two red can buoys, the positions of which may best be seen on the chart.

North-westward of Pulau Sajahat and westward of the north-western end of Pulau Tekong kechil there is shoal rocky ground, on which there are coral patches which dry 6 feet (1^{m}8) and from one to 3 feet (0^{m}3 to 0^{m}9), respectively. A 3-fathom (5^{m}5) patch lies about 6 cables westward of the northern extremity of Pulau Tekong kechil. A black conical buoy, No. 1, is moored about 1¼ cables northward of the patch.

Charts 2585, 2586.

Pulau Ubin, about 1½ miles westward of Pulau Tekong kechil, and

Charts 2585, 2586.

on the western side of the fairway to Sungei Johore, consists of hills, most of which are thickly wooded, fronted and intersected by extensive mangrove swamps. The soil on the elevated parts is a red earth and there is much granite on the island, where several quarries are worked.

A light is exhibited, at an elevation of 87 feet (26^{m}5), from a white iron beacon, 19 feet (5^{m}8) in height, on Tanjong Chek Jawa, the south-eastern extremity of Pulau Ubin.

Prohibited anchorages.—Anchorage is prohibited within an area, indicated by pecked lines on the charts, extending south-eastward and eastward from Beting Kusa, about three-quarters of a mile southward of Tanjong Changi, across Kuala Johore to Tanjong Stapa (page 212) on the mainland about 9 miles east-south-eastward.

Anchorage is also prohibited in an area between the south-western side of Pulau Tekong besar and a line drawn in a southerly direction from a point about 6½ cables westward of Tanjong Chek Jawa to the northern coast of Singapore island ; the limits of the area are indicated by pecked lines on the charts.

Chart 2585.

Calder harbour. — Dangers. — Lights. — Light-buoy. — Calder harbour is the name given to the channel between Pulau Tekong besar and the mainland eastward of it.

Merlin rock, over which there is a depth of 16 feet (4^{m}9), lies in the middle of the fairway, 7 cables northward of Tanjong Pengelih. In the southern part of the harbour for about a distance of one mile within Merlin rock there is a width of about half a mile between the 5-fathom (9^{m}1) lines on either side. About one mile northward of Tanjong Pasir, the eastern extremity of Pulau Tekong besar, and in the middle of the fairway is Karang Si Ajar (*Lat. 1° 26′ N., Long. 104° 05′ E.*), which dries 6 feet (1^{m}8), and from which a light is exhibited.

Batu Malang Beldaun, 2 feet (0^{m}6) high, lies about 1¼ miles north-westward of Karang Si Ajar, and is marked by a light. About 3½ cables south-south-eastward of it is Batu Belalai, which dries, lying about 1¼ cables off the north-eastern side of Pulau Tekong besar. Guillemard rocks, with depths of less than 6 feet (1^{m}8), lie on a bank about 2 cables off the mainland and parallel with it, with its south-eastern extremity about 3¼ cables northward of Karang Si Ajar.

Read rock, with a depth of 11 feet (3^{m}4), lies about 6 cables westward of Batu Malang Beldaun. Beting Bronok is a reef, which dries from one to 2 feet (0^{m}3 to 0^{m}6), lying on a bank, which is awash at its outer end, extending about 6 cables west-north-westward from the northern extremity of Pulau Tekong besar. Some fishing stakes are situated on this bank close eastward of Beting Bronok, and also within half a mile northward of the north-western extremity of the bank.

A conical light-buoy, exhibiting a *green flashing* light *every five seconds*, is moored 4½ cables north-westward of Beting Bronok.

Neville rock, with a depth of 8 feet (2^{m}4), lies about 3½ cables north-north-westward of Beting Bronok.

About 3 miles northward of Tanjong Pasir, is Bukit Belungkor, 713 feet (217^{m}3) high to the tops of the trees ; it is clear of trees on its eastern summit.

The holding ground in Calder harbour is generally good, consisting mostly of stiff mud, or sand and mud mixed, but there are many rocky patches to be avoided when anchoring.

Charts 3834, 2403, 2757, 3543, 1355.

Chart 2585.

For tidal streams in Calder harbour, *see* page 227.

Prohibited anchorage.—Anchorage is prohibited within an area, indicated by pecked lines on the chart, extending south-eastward from the southern side of Pulau Tekong besar to the mainland coast north-eastward of Tanjong Pengelih (*Lat. 1° 22′ N., Long. 104° 05′ E.*).

Sungei Johore.—Sungei Johore, the entrance to which lies between Pulau Tekong kechil and Tanjong Kopok, 1½ miles north-westward, is navigable for vessels with local knowledge with a draught up to 20 feet ($6^{m}1$) as far as Pulau Layang, 10 miles above Tanjong Kopok; above Pulau Layang the channel is barred by an extensive shoal over which the greatest depth is 7 feet ($2^{m}1$). Small craft, with a draught of 10 feet ($3^{m}0$), taking advantage of the tide, navigate the river as far as Kota Tinggi, a small town, the headquarters of a District officer, 24 miles from the entrance.

The central part of the river, about 3½ miles within the entrance, is named Surat roads and, about 3 miles northward of this, is The Pool.

Sungei Lebam joins Sungei Johore on its eastern side, about 3 miles within its entrance. Vessels with local knowledge with a draught of 14 feet ($4^{m}3$) can navigate the river as far as Junction point, a distance of about 6 miles, and those of 6 feet ($1^{m}8$) and less for another 5 miles. Kampong Sening, on the left bank of the river, about 4 miles within the entrance, is the headquarters of a rubber estate, and has daily communication by launch with Singapore.

For tidal streams in Sungei Johore, *see* page 227.

Directions.—A vessel approaching the entrance to Johore strait, or Sungei Johore, after passing Johore shoal light-buoy, should steer for the light-beacon on Tanjong Chek Jawa, bearing 311°, until abeam of Pulau Sajahat, when she may steer for the entrance to Johore strait or for Sungei Johore. In 1938, the gap in the Lunchoo range, shown in view B on chart 2585, was reported not to be visible from a position within Johore shoal light-buoy, and the trees on Tanjong Chek Jawa to be difficult to distinguish.

Chart 3834.

Coast.—Tanjong Stapa lies 3¼ miles east-south-eastward of Tanjong Pengelih, and between them a bank which dries from one to 4 feet ($0^{m}3$ to $1^{m}2$), extends about three-quarters of a mile offshore. Malang Berdaun, a rocky islet, which lies just outside this bank, has been described on page 210.

About 4 miles eastward of Tanjong Stapa is Tanjong Ayam, the southernmost point of the Malay peninsula, and between them are two bights, separated by Tanjong Kapal, the western of which is named Telok Ampang, which is almost filled by a mudbank. In the eastern bight there are some rocks from one to 4 feet ($0^{m}3$ to $1^{m}2$) high, and others which dry.

Gunong Pelali or Barbukit, 624 feet ($190^{m}2$) high, lies 4 miles northward of Tanjong Ayam; it is a regular pyramid rising from the low land, and is a useful object when approaching the eastern entrance to Singapore strait from northward; its summit has been cleared of trees. *See* view facing page 208, and on chart 3543.

About 1¾ miles east-north-eastward of Tanjong Ayam is Tanjong Chingham, close westward of which Sungei Ringgit discharges. Two rocks, with depths of less than 6 feet ($1^{m}8$), lie just inside the 3-fathom ($5^{m}5$) line, 3½ and 4½ cables southward of Tanjong Chingham.

Charts 3838, 3833, 2403, 795, 2757, 3543, 1355.

Chart 3834.

Fishing stakes.—There are several fishing villages between Tanjong Pengelih and Tanjong Chingham. The area between the shore and the 6-fathom ($11^{m}0$) line in this vicinity is so encumbered with fishing stakes and traps as to render navigation impossible.

Coast.—Pulau Remunia, 106 feet ($32^{m}3$) high, lies about half a mile east-north-eastward of Tanjong Chingham, and about 2 cables offshore. An islet, 50 feet ($15^{m}2$) high, lies close off the south-western side of Pulau Remunia, to which it is connected by a reef; both islets lie on the coastal bank.

Telok Pantai Mas lies at the eastern end of a bay situated between Tanjong Chingham and Tanjong Lahong, 2¼ miles east-north-eastward.

Tanjong Datok, the south-eastern extremity of the Malay peninsula, and the northern entrance point of Singapore strait, is flat and wooded, but there are some low hills north-westward of it. Bukit Batu, 329 feet ($100^{m}3$) high to the tops of the trees, is a conspicuous hill and the highest in the vicinity, lying 1¼ miles westward of the point. Coral reefs extend from one to 3 cables from the point. Farther offshore are the Lima islands and dangers south-eastward of them, which are described with the eastern entrance to Singapore strait on page 217.

Chart 3839.

Tanjong Punggai lies 4 miles northward of Tanjong Datok, and between them is Telok Punggai, which has depths of less than 3 fathoms ($5^{m}5$), extending 6 cables beyond the line joining the entrance points. A 4-foot ($1^{m}2$) patch lies on the edge of the 3-fathom ($5^{m}5$) line, 1¾ miles southward of Tanjong Punggai, and about 1½ miles offshore. Tanjong Punggai is 113 feet ($34^{m}4$) high, and wooded; close southward of it is Pulau Punggai, 73 feet ($22^{m}3$) high, and wooded. Sungei Punggai discharges about half a mile north-westward of the point, and is approached by a boat channel, navigable except at low water.

About 4½ miles northward of Tanjong Punggai (*Lat. 1° 26′ N., Long. 104° 18′ E.*) is Tanjong Penawar or Sitajam, with Telok Penawar between them. Depths of less than 3 fathoms ($5^{m}5$) extend about three-quarters of a mile beyond the line joining the entrance points. There is a considerable coast and riverside population, and there are frequent clearings in the jungle, but the greater part of the coast is covered with thick forest.

Bukit Twatow, about 455 feet ($138^{m}7$) high to the tops of the trees, lies 2 miles west-south-westward of Tanjong Penawar; these trees are a little more elevated than the coast, which is all rather low and wooded northward of the hills over Tanjong Datok. Bukit Twatow, being discernible during hazy weather much sooner than Gunong Pelali, is a useful object when approaching Singapore strait from northward. *See* view facing page 208.

For the coast northward, *see* China Sea Pilot, Vol. I.

Charts 3838, 3834.

Southern shore of eastern part of Singapore strait.—The eastern part of Singapore strait eastward of Sambo eilanden (page 189) is formed by the northern coasts of Batam and Bintan, lying on the western and eastern sides, respectively, of the northern entrance to Straat Riouw (Rhio strait).

Djodoh baai.—Danger.—Djodoh (Jodoh) baai is entered between Sambo eilanden and Tanjong Sengkoeang (Sengkuang), 7½ miles east-

Charts 3838, 3834.

ward. Several conspicuous islets lie on the wide coastal reef which fringes the whole shore ; of these, Dongas lies about 1½ miles eastward of Tanjong Pinggir, and Bokor, a similar distance farther eastward ; the reef extends about 2¾ cables north-eastward from the latter. Tanjong Oema (Oma) is the north-western extremity of a peninsula nearly one mile eastward of Bokor, separating the mouths of two rivulets. A detached reef lies 6½ cables north-north-westward of Tanjong Oema.

Anchorage may be obtained, in a depth of 5 fathoms (9^{m}1), between Dongas and Bokor.

Chart 3834.

Coast.—Light.—Dangers.—Beacons.—Tanjong Sengkoeang is the north-eastern extremity of a peninsula which separates Djodoh baai and Tering baai. Eastward of Djodoh baai the northern coast of Batam is hilly as far as Tanjong Sabang, on the western side of the entrance to Straat Riouw, but there are no conspicuous summits ; the headlands are rugged and the edges of the reefs are generally marked by fishing stakes.

Tering baai is entered between Tanjong Sengkoeang and Tanjong Kapoer (Kapur), about 3 miles eastward. Both shores are fringed with reef ; about three-quarters of a mile eastward of Tanjong Sengkoeang are some rocks which dry 3 feet (0^{m}9), and about 4 cables farther eastward is a 3-fathom (5^{m}5) patch. Depths of over 3 fathoms (5^{m}5) extend in the middle of the bay as far southward as abreast of Tanjong Lamoen (Lamun), 2½ miles south-eastward of Tanjong Sengkoeang. Farther southward the bay widens, but it is encumbered with drying patches, and near the head are two low wooded islets, Sembakau besar and Sembakau kechil. Several rivulets discharge into the bay, but they are barely navigable for small craft.

Nongsa (*Lat. 1° 12′ N., Long. 104° 05′ E.*) consists of two islets lying on a reef, about half a mile north-westward of Tanjong Batoebelah (Batubelah), situated three-quarters of a mile north-eastward of Tanjong Kapoer ; the northern islet is 65 feet (19^{m}8) high, rugged, and overgrown, the southern islet consisting of a sand cay covered with scrub. Between the reef on which they lie and the coastal reef there is a least depth of 7½ fathoms (13^{m}7) in the fairway. A spit, with depths of less than 3 fathoms (5^{m}5), extends about 3 cables north-eastward from the northern islet.

Rosa klip, which dries and is steep-to, lies about one mile eastward of Nongsa and about half a mile offshore.

Tanjong Babi, the northern extremity of Batam, is the eastern entrance point of Sungei Nongsa ; this rivulet has depths of from 6 to 7 feet (1^{m}8 to 2^{m}1), and in the approach channel, only 1½ feet (0^{m}5). On the western side of the entrance is Nongsa village.

Between Tanjong Babi and Tanjong Sabang, 4½ miles south-eastward, there are several villages and the coastal reef extends from about one to 7½ cables offshore.

Straat Riouw, the northern entrance of which lies between Tanjong Babi and Tanjong Tondang, about 13 miles eastward, and the dangers between them, are described in Eastern Archipelago Pilot, Vol. IV.

Pas op klip, with a least depth of 6 feet (1^{m}8), lies about 2¼ miles northward of Tanjong Sabang and about one mile offshore ; it is marked by a white iron beacon surmounted by a ball.

Charts 2403, 2757, 3543, 1355, 2660a, 941a, 1263.

Chart 3834.

A white can buoy No. 20, and a black conical buoy, No. 21, are moored about 4¼ miles north-north-eastward and 3¼ miles north-eastward, respectively, of the beacon marking Pas op klip.

A light is exhibited, at an elevation of 30 feet ($9^{m}1$), from a white iron framework structure, 33 feet ($10^{m}1$) in height, on the north-eastern end of Pan rif, in the northern entrance to Straat Riouw. A black iron beacon, surmounted by a cone, stands on the south-western edge of the reef.

Bintan.—Reefs.—Bintan, like most of the other islands in Singapore strait, is covered with trees, and except for the hills inland, is not high.

Vessels should not get within depths of 10 fathoms ($18^{m}3$) as within those depths the bottom is very irregular, and there are shallow patches which are difficult to detect, though they may frequently be distinguished by tide-rips.

Groote Bintanberg (Bintan Great hill) (chart 2413), 1,213 feet ($369^{m}8$) high, and Kleine Bintanberg (Bintan Little hill), 777 feet ($236^{m}8$) high, are conspicuous peaks, about 11 and 9 miles, respectively, south-eastward of Tanjong Tondang ; they are good marks for vessels approaching Singapore strait from the China sea. From northward Groote Bintan shows a saddle-shaped summit.

Tanjong Tondang is rugged, overgrown, and may be identified by Tondang, a small islet lying about one cable westward of the point ; close southward of this islet is a rock with two coconut palms on it. About 1¾ miles east-north-eastward of Tanjong Tondang is Tanjong Pergam, 298 feet ($90^{m}8$) high, with Pergam, an islet, lying on the coastal reef between, and several other small islets lying from 2½ to 4½ cables offshore.

Tanjong Said, situated about one mile eastward of Tanjong Pergam, and Tanjong Sambang, 1½ miles farther east-north-eastward, are the entrance points of a bay, the shores of which are fringed by a reef, with some rocks above water on it, extending from 1½ to 4½ cables offshore. Within three-quarters of a mile northward of Tanjong Sambang, are two patches with depths of 2¾ and 3 fathoms ($5^{m}0$ and $5^{m}5$). The coast thence to Tanjong Tombak, 2½ miles eastward, is fringed by a reef extending about 1½ cables offshore, with several rocks above water on it. An islet lies 1¾ cables northward of Tanjong Sading, one mile east-north-eastward of Tanjong Sambang (*Lat. 1° 12′ N., Long. 104° 23′ E.*), and Dedep, an islet, lies on the coastal reef about 3 cables north-westward of Tanjong Tombak.

Off-lying dangers.—Lagoi rif consists of three rocky patches, with a least depth of 8 feet ($2^{m}4$), lying within 1¾ miles northward of Tanjong Said. About midway between this reef and Tanjong Sambang is Karang Mandjang (Manjang), with a depth of 13 feet ($4^{m}0$).

Diana rif, consisting of several ridges of sand, with depths of from 16 to 18 feet ($4^{m}9$ to $5^{m}5$), lie from 1¾ to 2¾ miles northward of Tanjong Tombak. Between the reef and Tanjong Sading there are several sunken rocks, and between Diana and Lagoi riffen are several patches with depths of 28 feet ($8^{m}5$). A ridge, with depths of less than 6 fathoms ($11^{m}0$), extends 2¼ miles east-north-eastward from the shoalest part of Diana rif.

Sekerah, an islet lying close north-westward of Tanjong Sebong, situated about 5½ miles south-westward of Tanjong Tondang, bearing

Charts 2413, 2403, 2757, 3543, 1355, 2660a, 941a, 1263.

Chart 3834.

227°, well open north-westward of Tanjong Tondang, leads north-westward of Lagoi and Diana riffen.

Soempat baai.—Dangers.—Beacon.—Soempat (Sumpat) baai is entered between Tanjong Sading and the western side of Tanjong Berakit, about 9 miles eastward; the head and eastern part of the bay are fringed by a reef which extends from about half a mile to one mile offshore.

Soempat (Sumpat), an islet, 230 feet ($70^{m}1$) high, rocky, and wooded, lies in the eastern part of the bay on the edge of the coastal reef, and may be identified by its saddle shape. Two rocks above water lie close north-westward and south-eastward, respectively, of the islet, and a wooded rock lies on the coastal reef 3½ cables east-north-eastward; a patch, which dries 4 feet ($1^{m}2$), lies 1½ miles westward of the islet, and one mile offshore. Soempat village stands on the coast southward of the islet.

About one mile north-eastward of Soempat is the entrance of a narrow creek named Sungei Beroe (Beru). There are two villages on the northern side of the entrance; the creek is navigable for boats at high water, but it is soon lost in mangrove swamps.

A rock, with a depth of 16 feet ($4^{m}9$), lies near the middle of Soempat baai, about 2½ miles north-westward of Soempat. A 21-foot ($6^{m}4$) patch lies 2 miles west-north-westward of the same islet; a shoal, consisting of sand and stones, with a depth of 9 feet ($2^{m}7$), lies about 1¾ miles north-north-eastward of the islet and a reef lies about 4 cables north-north-eastward.

Tanjong Berakit, the north-eastern extremity of Bintan, is a noticeable headland on which there are some hills, the highest, with an elevation of 289 feet ($88^{m}1$), lying nearly 2 miles southward of the point; there are some trees on the point.

The point is fringed by a reef which extends three-quarters of a mile northward and half a mile westward; on the reef are Berakit, an islet about 40 feet ($12^{m}2$) high to the tops of the trees, and Black rock, above water.

Light.—A light (*Lat. 1° 13′ N., Long. 104° 35′ E.*) is exhibited, at an elevation of 219 feet ($66^{m}7$), from a white iron framework structure, 98 feet ($29^{m}9$) in height on the north-eastern side of Tanjong Berakit.

Off-lying dangers.—Postiljon (Postillion) rif, with a least depth of 12 feet ($3^{m}7$), lies near the western end of a bank with depths of less than 6 fathoms ($11^{m}0$), about 1¾ miles north-north-westward of the northern extremity of Tanjong Berakit.

Chart 2403.

Berakit klip, with a depth of 3 feet, lies about 3 miles north-north-eastward of Tanjong Berakit light structure. A coral patch, with a depth of 19 feet ($5^{m}8$), lies about 2 cables north-westward of the rock; the depths in the vicinity are irregular.

Horsburgh lighthouse (page 217) in line with Bukit Batu (page 213), bearing 285°, leads northward of Berakit klip.

Charts 3834, 2403.

Coast.—Koko, an islet, lies on the coastal reef on the eastern side of Tanjong Berakit. Tanjong Lokan, which is fringed by a reef, lies about one mile southward of Koko. Thence to a point 3¾ miles southward, the coastal reef extends about 3½ cables offshore in places, but there are no outlying reefs.

Charts 2413, 2403, 2757, 3543, 1355, 2660a, 941a, 1263.

Charts 3834, 2403.

For the coast southward, *see* Eastern Archipelago Pilot, Vol. IV.

Chart 3834.

Middle channel.—Lights.—Dangers and banks.—Middle channel, between Pedra Branca, and Remunia shoals, is 4 miles wide, and is the passage generally used by vessels passing through Singapore strait.

Pedra Branca, 24 feet ($7^{m}3$) high, lies on the western edge of a bank, with depths of less than 10 fathoms ($18^{m}3$), in the middle of the eastern entrance to Singapore strait, 7¾ miles east-south-eastward of Tanjong Datok (page 213).

A light is exhibited, at an elevation of 101 feet ($30^{m}8$), from a black circular tower with white bands, 112 feet ($34^{m}1$) high, known as Horsburgh lighthouse, on Pedra Branca. *See* view facing page 208.

A rock, which dries 2 feet ($0^{m}6$), lies about 3 cables eastward of the lighthouse, and a 27-foot ($8^{m}2$) patch, which is steep-to, lies 4 cables northward of the lighthouse.

Middle rocks, from 2 to 4 feet ($0^{m}6$ to $1^{m}2$) high, and of a whitish colour, lie about half a mile southward of the lighthouse, and on the south-western edge of the bank on which Pedra Branca lies.

Lima islands together with many dangers around them, extend about 3 miles in a north-north-easterly and south-south-westerly direction, and 2¼ miles south-eastward of Tanjong Datok. Vessels should avoid this locality.

Tanjong Ayam in line with Tanjong Stapa, bearing 274°, leads southward of these dangers.

Pulau Lima, 110 feet ($33^{m}5$) high, is the westernmost and largest of the group; it lies 6 cables south-eastward of Tanjong Datok and is wooded; Pulau besar lies half a cable north-eastward of Pulau Lima, and has a single tree on its summit.

Pulau Mungging, 79 feet ($24^{m}1$) high, and wooded, lies about 3 cables south-eastward of Pulau Lima. A spit, on the outer end of which is a rock, 2 feet ($0^{m}6$) high, extends about 4 cables south-westward from Pulau Mungging, and a 3-fathom ($5^{m}5$) patch lies half a mile south-eastward of the rock.

A light is exhibited, at an elevation of 65 feet ($19^{m}8$), from a red iron framework structure, on Pulau Mungging. The light structure is difficult to distinguish, and, on most northerly bearings, is obscured by trees.

A rock, with a depth of 13 feet ($4^{m}0$), lies 1½ miles south-westward of Pulau Mungging, and is the south-westernmost danger; a 28-foot ($8^{m}5$) patch lies half a mile east-south-eastward of this shoal.

Falloden Hall shoal, with a depth of 15 feet ($4^{m}6$), lies on the north-western part of a bank, with depths of less than 10 fathoms ($18^{m}3$), extending 1¾ miles in a north-north-easterly and south-south-westerly direction, 11 cables south-eastward of Pulau Mungging.

Stork reef, which dries 3 feet ($0^{m}9$), lies about one mile east-south-eastward of Pulau Mungging. Peak rock, 37 feet ($11^{m}3$) high, a barren rock of reddish colour and easily identified, lies 4 cables north-eastward of the same island, and a 9-foot ($2^{m}7$) patch lies 1½ cables eastward of Peak rock. Congalton Skar, a rocky patch with a depth of 5 feet ($1^{m}5$), and steep-to, lies about three-quarters of a mile eastward of Peak rock.

Whale rock (*Lat. 1° 22′ N., Long. 104° 19′ E.*), about 6 cables north-

Charts 2403, 2757, 3543, 1355, 2660a, 941a, 1263.

Chart 3834.

eastward of Peak rock, dries 7 feet ($2^{m}1$) ; it is a small ledge on which the sea generally breaks, and is steep-to on its north-eastern side. Between Whale rock and Peak rock there are irregular depths of from 28 to 42 feet ($8^{m}5$ to $12^{m}8$). Jones reef, with a depth of less than 6 feet ($1^{m}8$), and steep-to on its northern side, lies 3 cables north-eastward of Whale rock.

Lima channel, between Tanjong Datok and the Lima islands, is used by coasting vessels, but as it is narrow and encumbered with shoals, it should not be used without local knowledge.

Pulau Gruda, 104 feet ($31^{m}7$) high, and wooded, lies about half a mile north-north-eastward of Pulau besar ; a bank, with depths of less than 3 fathoms ($5^{m}5$), extends 1½ cables southward and 2½ cables northward from the island. About half a mile westward of Pulau Gruda, and on the western side of Lima channel, is Aratoon Apcar rock, with a depth of 10 feet ($3^{m}0$), and close north-westward of it is a patch with a similar depth.

North rock, 32 feet ($9^{m}8$) high, with a few bushes on it, lies three-quarters of a mile northward of Pulau Gruda, and on the eastern side of Lima channel. Foul ground, on the outer end of which is a rock, one foot ($0^{m}3$) high, extends 3½ cables southward from North rock. A reef, with rocks on it which dry from 4 to 6 feet ($1^{m}2$ to $1^{m}8$), lies between Pulau Gruda and North rock. A 22-foot ($6^{m}7$) patch lies about midway between this reef and Jones reef.

Pulau Punggai in line with Bukit Twatow, bearing 326°, leads north-eastward of all the dangers off Lima islands.

A bank, with depths of 9 and 10 fathoms ($16^{m}5$ and $18^{m}3$), lies about 4 miles south-south-eastward of Pulau Mungging ; it is marked by heavy overfalls and eddies, which also occur about one mile farther south-eastward.

Charts 3834, 3839.

Remunia shoals are a number of detached patches of coarse sand and gravel, stretching in a north-easterly and thence northerly direction from the Lima islands, the outer edge lying about 10 miles offshore ; they are steep-to on their eastern and southern sides, there being depths of from 12 to 20 fathoms ($21^{m}9$ to $36^{m}6$) at a short distance, and between the patches there are depths of over 6 fathoms ($11^{m}0$).

The shoalest spot, over which there is a depth of 15 feet ($4^{m}6$), lies about 5 miles northward of Horsburgh lighthouse, and the northern extremity, as defined by the 6-fathom ($11^{m}0$) line, lies 11 miles northward of the lighthouse.

North patch, with a least depth of 21 feet ($6^{m}4$), lies at the northern end of Remunia shoals as defined by the 6-fathom ($11^{m}0$) line, but depths of less than 10 fathoms ($18^{m}3$) extend nearly 3 miles farther northward.

Between the south-western end of Remunia shoals and the mainland the depths are very irregular.

Chart 2403.

The foot of the eastern slope of Kleine Bintanberg in line with the western summit of Groote Bintanberg, bearing 182°, leads eastward of North patch.

Horsburgh lighthouse (*Lat. 1° 20′ N., Long. 104° 24′ E.*) in line with the middle of the western slope of Groote Bintanberg, bearing 169°, leads eastward of the shoalest part of Remunia shoals, and

Charts 2757, 3543, 1355, 2660a, 941a, 1263.

Chart 2403.

between two 5-fathom ($9^{m}1$) patches. This track is only recommended for vessels of shallow draught.

Eddies, which cause discoloured water, make the whole shoal appear to have a less depth over it than that indicated on the chart.

Chart 3839.

Eastern bank, the outermost bank on the northern side of the approach to Singapore strait, has a least depth of 8 fathoms ($14^{m}6$), and lies about 12½ miles north-north-eastward of Horsburgh lighthouse.

North channel.—North channel, lying between Remunia shoals and the mainland westward, is encumbered with several shoals, with depths of from 3 to 6 fathoms ($5^{m}5$ to $11^{m}0$) at its southern end. As no advantage is gained by passing through, except when bound northward along the coast, this channel should not be used without local knowledge.

During the survey in 1924, H.M.S. *Iroquois* frequently made use of North channel by steering 000° and passing 1½ miles eastward of Falloden Hall shoal, until Pulau Punggai was in line with Bukit Twatow, bearing 326°, when course was altered on to this line of bearing, being again altered northward when Tanjong Datok bore 225°.

Chart 3834.

South channel.—Dangers.—South channel lies between Pedra Branca and the northern side of Bintan.

Carter shoal is a pinnacle rock, with a depth of 10 feet ($3^{m}0$), lying about 4½ miles south-westward of Horsburgh lighthouse ; it is steep-to on its eastern side and is marked by heavy overfalls. A shoal, with a least depth of 30 feet ($9^{m}1$), and marked by heavy overfalls, lies about 8 cables south-south-eastward of Carter shoal.

South ledge, consists of three rocks, the northern of which dries 8 feet ($2^{m}4$) and lies about 2 miles south-south-westward of Horsburgh lighthouse ; the others do not uncover. They are steep-to and are nearly always marked by heavy tide-rips or by breakers. Rocky heads, having depths of 10 fathoms ($18^{m}3$), lie between the lighthouse and South ledge, and a bank, with depths of 10 fathoms ($18^{m}3$), lies about 1½ miles south-south-eastward of South ledge, and another about 2 miles eastward.

Current.—Tidal streams.—(*See* chart 5171). In making the eastern entrance of Singapore strait from northward, vessels should always be prepared to meet with a southerly current in the North-east monsoon, and a northerly one in the opposite season, the rate of which is governed by the strength of the monsoon.

For tidal streams *see* Admiralty Tide and Tidal Stream tables for predictions of tidal streams in the vicinity of Horsburgh lighthouse and notes on the tidal streams in Singapore Main strait. These predictions do not include the effects of the current which are largely dependent on the strength of the monsoon.

Charts 3838, 3834.

Directions.—*Singapore road to the eastward.*—Having cleared Singapore road, a vessel should steer about 085°, and when nearing Johore shoal should keep Fort Canning flagstaff (or the *white* light at night) bearing more than 270°, which will lead southward of it. Pulau Mungging (*Lat. 1° 22′ N., Long. 104° 18′ E.*), bearing 075°, just open of Tanjong Ayam, also leads southward of Johore shoal. When Bukit

Charts 3838, 3834.

Pengerang (page 210) bears 000°, the vessel will be eastward of Johore shoal, and may steer for Horsburgh lighthouse, bearing about 080°, until within about 5 miles of it, when she may alter course to pass about one mile northward of it, and into the China sea.

Poor visibility is not common and a vessel is generally able to fix her position ; but if unable to do so the soundings will show whether she is within the 20-fathom (36^{m}6) line, which should be avoided, and course altered as necessary to keep in the deep channel, passing in preference over the 9-fathom (16^{m}5) bank westward of Horsburgh lighthouse, and avoiding the area within the 20-fathom (36^{m}6) line off Lima islands. If in any doubt a vessel should haul towards the northern shore, by sounding, and anchor. This shore may be approached to depths of from 11 to 12 fathoms (20^{m}1 to 21^{m}9) ; Pulau Mungging bearing 075°, as above mentioned, kept open of Tanjong Ayam, leads southward of Johore shoal, and, when standing towards that danger, if these objects cannot be seen, the vessel should preserve the depths mentioned, for the shoal is steep-to.

When eastward of Tanjong Ayam, the vessel should keep Tanjong Stapa in line with, or open of Tanjong Ayam, bearing 274°, until Pulau Mungging bears less than 360° ; when standing towards Falloden Hall shoal, she should not bring Tanjong Ayam to bear less than 266°, and when standing towards Congalton Skar and the shoals northward of it, she should keep Tanjong Punggai (chart 3839) bearing less than 337°. She may stand towards Remunia shoals until the southern extremity of Pulau Mungging (*Lat. 1° 22′ N., Long. 104° 18′ E.*) bears 256°.

From the China sea.—Vessels entering Singapore strait from the China sea usually pass through Middle channel, in the fairway of which there are no dangers. They should steer to pass about 1¼ miles northward of Horsburgh lighthouse, and thence through the middle of the channel.

The entrance may be easily identified in clear weather by Groote Bintanberg (page 215), and Gunong Pelali (page 212), the sharp-peaked hill on the opposite side of the strait.

Charts 3834, 3839, 3543.

Departing from Pulau Aur (China Sea Pilot, Vol. I), a vessel should bring it to bear about 360° or less when disappearing ; if the weather is clear, Groote Bintanberg and Pulau Aur may be seen together, but this seldom happens. The foot of the eastern slope of Kleine Bintanberg in line with the western summit of Groote Bintanberg, bearing 182°, leads nearly one mile eastward of North patch.

In making the entrance at night, if the vessel's position be known, it will be merely necessary to stand on boldly for Horsburgh light, making allowance for the set of the stream ; and when the light is seen, steer so as to pass from about one to 2 miles northward of it.

In slightly hazy weather, with Pulau Aur disappearing astern, bearing 360° or less, a course between 192° and 204° may be requisite if the north-easterly-going stream is setting out of Singapore strait. The depths will decrease regularly in steering southward, and the low land will probably be seen to the westward when in depths of from 18 to 20 fathoms (32^{m}9 to 36^{m}6) ; if so the vessel should coast along it at a distance of about 13 miles, until Bukit Twatow (page 213) is sighted (*see* view facing page 208). If in any doubt about the position of the vessel, or a depth of from 10 to 12 fathoms (18^{m}3 to

Charts 3834, 3839, 3543.

21^{m}9) be obtained, she should either haul off the land or anchor.

Chart 3834.

If proceeding westward, Tanjong Ayam in line with Tanjong Stapa, bearing 274°, leads southward of Remunia shoals and the dangers southward of Pulau Mungging, and thence Pulau Mungging, bearing 075°, just open southward of Tanjong Ayam leads southward of Johore shoal, whence a course may be shaped for Singapore road.

Chart 1995, 3838.

The vessels in the road will be a guide in approaching the anchorage, and as Tanjong Katong is neared, the flagstaff on Fort Canning hill should be brought to bear about 287°, which leads in.

Charts 3838, 3834, 3839.

At night it is necessary to keep a good look-out for Horsburgh light (*Lat. 1° 20′ N., Long. 104° 24′ E.*), which should be in sight before a vessel is close to the dangers at the entrance of the strait. It is a sufficient guide for navigating Middle channel.

The light bearing 215° will lead well south-eastward of Remunia shoals; when about 2 miles from the light a course may be shaped to pass about 2 miles northward of it, and to bring it astern, bearing about 080°, until the light on Fort Canning at Singapore comes in sight.

Both lights will be visible at the same time in clear weather, when about midway between them. Fort Canning should be brought to bear about 287°, which leads in between the shoals off Tanjong Katong and Outer shoal.

In the event of Fort Canning light not being directly made out by the time Bukit Pengerang bears 012°, care is necessary not to get into depths of less than 16 fathoms (29^{m}3) towards Johore shoal; and if a depth of 10 fathoms (18^{m}3) be obtained the course should be altered immediately southward, for this shoal is steep-to, and cannot be approached with safety under that depth.

Charts 3838, 3837.

If bound into Malacca strait, with Fort Canning light in sight, when St. John light is sighted, course may be altered to pass southward of St. John islands, observing that Raffles light is visible from a distance of about 8 miles eastward of those islands, and when clear of them, leads clear of all dangers northward of them. A vessel should steer to pass within a short distance of St. John islands, avoiding the southern side of the strait, thence passing southward of Raffles light at a prudent distance, and shaping course for Malacca strait.

Chart 3834.

South channel is not recommended for vessels of deep draught, as there is no advantage gained by using it, and the bottom is generally rocky and uneven, and is encumbered with shoals.

Should, however, a vessel find herself in South channel, and southward of Horsburgh light, she should steer north-westward with Gunong Pelali bearing 303°, open south-westward of Bukit Batu, the highest coastal hill, which leads between Carter shoal and South ledge in a depth of not less than 10 fathoms (18^{m}3) (*see* view on chart); and as soon as Horsburgh lighthouse bears 056°, she may shape course through the fairway of the strait for Singapore road. At low water, when both South ledge and Middle rocks are plainly visible, it is often preferable to pass between them instead of proceeding along the leading line

Charts 2403, 2757, 3543, 1355, 2660a, 941a.

Chart 3834.

just mentioned, especially when, as frequently happens, rainclouds obscure Gunong Pelali (*Lat. 1° 24′ N., Long. 104° 12′ E.*).

Charts 2587, 2586.

JOHORE STRAIT.—Johore strait, known locally as Selat Tebrau, is the channel between Singapore island and the Malay peninsula; it was formerly the passage used by all vessels passing between India and China, when the Main strait at present in use was not known to be navigable. There is no passage through now for any except small craft, on account of the railway causeway eastward of Johore Bahru.

Since the completion of the causeway extensive silting has taken place all along the foreshore of Johore strait, and in all the rivers which flow into it. Many rivers which could formerly be navigated by vessels with a draught of about 6 feet ($1^{m}8$), are now impassable.

Pilots.—Pilots can be obtained at Singapore, but their knowledge of the western portion of the strait is limited. *See* also page 209.

Charts 2587, 3833.

WESTERN ENTRANCE.—Dangers.—Light.—Beacons.—The western approach is fronted by a bank with depths of less than 3 fathoms ($5^{m}5$), through which there is a narrow channel with a least depth of about 21 feet ($6^{m}4$) on the leading line. This entrance is much used by local craft visiting Johore Bahru, but vessels should not attempt it without local knowledge.

The depths in the western portion of the strait are very irregular; the least depth in West reach is about 20 feet ($6^{m}1$), about half a mile above Kolek rocks; in the Putri narrows there is a depth of 19 feet ($5^{m}8$) on the leading line in North channel, and 26 feet ($7^{m}9$) on the leading line in Middle channel. Vessels of more than 18 feet ($5^{m}5$) draught, or 350 feet ($106^{m}7$) in length, should not use the western entrance of the strait. The best time to enter the strait is from 2 to 3 hours before high water at Singapore.

Chart 3833.

From Tanjong Piai (page 176) to Tanjong Kupang or Poh, 7 miles north-eastward, the coast on the north-western side of the entrance is low, without any features.

Sungei Pulai, a moderately large river, which rises eastward of Gunong Pulai (chart 795), a prominent mountain situated about 20 miles northward of Tanjong Piai, discharges between Tanjong Bin, 4¾ miles north-north-eastward of Tanjong Piai, and Tanjong Kupang. The northern shore of the entrance to the river westward of Tanjong Kupang is composed of mud and sand, backed by mangroves. There is a depth of nearly 10 fathoms ($18^{m}3$) in the narrows abreast Tanjong Pelepas, situated about 1¼ miles northward of Tanjong Bin, but there is a bar across farther southward, and the entrance should not be attempted without local knowledge.

In 1925, the best line of approach to Sungei Pulai was to pass close westward of a group of fishing stakes situated about 2 miles east-north-eastward of Tanjong Piai, and steer 015° until the entrance to the river was opened, then alter course into the channel and hug the western shore. There is a pier at Tanjong Pelepas, with a depth of 24 feet ($7^{m}3$) alongside.

Charts 2403, 795, 2757, 3543, 1355.

Chart 2587.

Tanjong Gul (*Lat. 1° 18′ N., Long. 103° 40′ E.*), the eastern entrance point of Johore strait, is a low, wooded point, with a summit, 135 feet (41^{m}1) high, about 3 cables northward of it. Tanjong Teritip, a low mangrove point with coconut palms on it, lies about 6 cables north-westward of Tanjong Gul. Between Tanjong Teritip and Tanjong Tuas, about one mile north-westward, there is a small bay, and the coast continues of the same character to Tanjong Kampong, about one mile farther. About midway between Tanjong Tuas and Tanjong Kampong is Bukit Piatu, 115 feet (35^{m}0) high. The whole coast between Tanjong Gul and the entrance to Sungei Blukang, 3 miles north-westward, is fringed by a rocky ledge, which dries from one to 3 feet (0^{m}9).

Alert shoal, situated near the middle of the entrance to Johore strait, has been described on page 179.

Terembu Paya, a coral patch, which dries from 2 to 5 feet (0^{m}6 to 1^{m}5), lies three-quarters of a mile west-south-westward of Tanjong Tuas; it is marked on its southern side by a red beacon, No. 25.

Two sandbanks, with depths of from 4 to 6 feet (1^{m}2 to 1^{m}8), lie about half a mile westward and 7 cables south-westward of No. 25 beacon; and a coral patch, which dries 2 feet (0^{m}6), lies about half a mile northward of the beacon.

Pulau Merambong, 45 feet (13^{m}7) high, is a conspicuous wooded islet lying in the middle of the entrance to Johore strait, close westward of the channel. There are a few huts on the islet, and a reef which dries from 2 to 3 feet (0^{m}6 to 0^{m}9), extends from half a cable to one cable all round it.

A light is exhibited, at an elevation of 25 feet (7^{m}6), from a black framework tower on Pulau Merambong.

Kolek rocks, which dry 2 feet (0^{m}6), are a group of boulders lying about 2 cables north-eastward of Pulau Merambong, and 1¾ cables westward of the leading line into the strait.

Merambong spit, over which there is a least depth of one foot (0^{m}3), is a hard sand and mud spit, extending with depths of less than 3 fathoms (5^{m}5), about 2¾ miles north-north-eastward from Pulau Merambong.

Tanjong Merawang is the southern extremity of Pulau Kampong, which lies close south-westward of Tanjong Kampong. This island is marked on its western side by a red beacon, No. 28. A rocky patch, with depths of from 2 to 3 feet (0^{m}6 to 0^{m}9), lies off the entrance to Sungei Blukang, about 7 cables north-north-eastward of No. 28 beacon.

West reach.—Dangers.—Beacons.—West reach extends from Pulau Merambong to the entrance to Sungei Malayu, on the western side of the strait, about 10 miles north-north-eastward. In places, the channel is narrow and intricate, and great care is necessary, the tidal streams being strong, and the shoals numerous.

Northward of Tanjong Kupang is the Kupang range of hills, the highest of which is Woody hill, the tops of the trees on its summit having an elevation of 365 feet (111^{m}2). Bukit Kupang, 263 feet (80^{m}2) high, on which there is a black and white iron beacon surmounted by a diamond, lies 4 cables northward of Woody hill. Sentinel hill, with two conspicuous trees close eastward of its summit, lies three-quarters of a mile south-south-westward of Woody hill. On the eastern side of the entrance to the strait there are similar but lower

Chart 2587.

hills; many of the hills inland are cleared, but those near the coast are densely wooded.

The western shore between Tanjong Kupang and the entrance to Sungei Pendas, 3 miles north-eastward, is composed of mud and sand, backed by mangroves, and there are a few noticeable trees, the most remarkable of which is a clump of casuarinas, about 115 feet (35^{m}0) high, about midway along this shore.

Sungei Pendas rises northward of Bukit Kupang; there is a native village on the northern side of its entrance.

Tanjong Karang (*Lat. 1° 21′ N., Long. 103° 38′ E.*), the northern entrance point of Sungei Blukang, is a narrow promontory, with a red cliff, 25 feet (7^{m}6) high, on its western face. Sungei Blukang, and Sungei Blukang kechil, which flows into its southern side, is navigable by canoes. Mud flats, with patches of rock and coral, extend offshore in this vicinity and dry in patches. A rocky patch, which dries 3 feet (0^{m}9), lies a quarter of a mile northward of Tanjong Karang.

About 7 cables north-north-eastward of Tanjong Karang is Tanjong Pasir Laba, with Sungei Tengeh between. Densely wooded hills lie eastward of Tanjong Pasir Laba, reaching an elevation of 230 feet (70^{m}1).

Between Tanjong Pasir Laba and Tanjong Bajau, a red cliff, 23 feet (7^{m}0) high, about one mile north-north-eastward, there is a bay, on the shore of which there are some low red cliffs.

Foul ground, with depths of less than 18 feet (5^{m}5), extends about 2 cables from the shore about 3½ cables north-eastward of Tanjong Pasir Laba, and 3½ cables northward of Tanjong Bajau is a 13-foot (4^{m}2) patch; the latter nearly joins a long sand spit, with depths of from 2 to 18 feet (0^{m}6 to 5^{m}5), which fronts the eastern shore between the estuary of Sungei Berih and Pulau Pergam, an island, 66 feet (20^{m}1) high, lying on the mudbank about 1¾ miles northward of Tanjong Bajau.

Sungei Berih consists of two moderately large rivers and numerous creeks, flowing into West reach between Tanjong Bajau and Tanjong Berih, 8 cables north-eastward.

The hills in the south-western part of Singapore island are not generally conspicuous, but Bukit Chao Chu Kang, a cleared hill, 286 feet (87^{m}2) high, situated about 2½ miles eastward of Tanjong Pasir Laba, may be identified by a white beacon, surmounted by a black diamond on its summit.

On the northern side of the entrance to Sungei Pendas is a remarkable isolated hill, 94 feet (28^{m}7) high, and densely wooded. With this exception the coast between this river and Tanjong Bunga, about 7 cables north-north-eastward, is low and backed by mangroves and coconut palms. On Tanjong Bunga there is a bungalow and a pier with a depth of 2 feet (0^{m}6) at its head.

Between Tanjong Bunga and the entrance to Sungei Bahan, about one mile northward, there is a rubber plantation, and a few houses and coconut palms; the coast here is backed by undulating country from about 80 to 140 feet (24^{m}4 to 42^{m}7) high, most of the land being under cultivation. There is a pier, which dries, situated 6 cables northward of Tanjong Bunga. On the northern entrance point of Sungei Bahan are some brick works.

Charts 2403, 795, 2757, 3543, 1355.

Chart 2587.

From Tanjong Berih (*Lat. 1° 23′ N., Long. 103° 39′ E.*), the eastern shore continues of the same character for 1½ miles to Tanjong Murai, patches of rock and coral which dry extending a quarter of a mile off it.

Lucy rock, with a depth of 18 feet ($5^{m}5$), lies close eastward of the middle of the fairway, 3¼ cables west-south-westward of Pulau Pergam.

Between Tanjong Murai and Tanjong Gedong, about 1¼ miles north-north-eastward, the coast is steep-to. Bukit Pergam, 280 feet ($85^{m}3$) high, is a fairly conspicuous bare hill lying about 6 cables eastward of Tanjong Murai.

For about one mile north-eastward of Sungei Bahan the western shore is of the same character as southward of it, thence it becomes steep-to, and at Tanah Runtoh there are cliffs, 90 feet ($27^{m}4$) high.

Putri narrows.—Dangers.—Beacon.—In the Putri narrows from Tanah Runtoh to about 3 cables beyond Tanjong Setajam, on the northern side of the strait, 1¾ miles north-eastward, the bottom is very foul and great caution is necessary.

About one mile northward of Tanah Runtoh, the Sungei Perpat, a shallow sluggish river, discharges into the Putri narrows. The western shore, northward of Tanah Runtoh, changes, the hills being nearly all cleared and cultivated; the most conspicuous mark is Bukit Setajam, 146 feet ($44^{m}5$) high, and cultivated, situated 6 cables east-north-eastward of the eastern entrance point of Sungei Perpat.

On the eastern shore, close northward of Tanjong Gedong, is the entrance to Sungei Karang, the coast being backed by densely-wooded hills, from about 70 to 160 feet ($21^{m}3$ to $48^{m}8$) high, with several creeks. About half a mile north-eastward of Sungei Karang, is the entrance to Sungei Sarimbun, Sungei Hantu discharging between. At the eastern side of the entrance to Sungei Sarimbun there are cliffs, 42 feet ($12^{m}8$) high.

Pulau Sarimbun, 85 feet ($25^{m}9$) high, and densely wooded, lies on the southern side of the strait, close off the mouth of Sungei Sarimbun. Foul ground extends about half a cable from the south-western side, and three-quarters of a cable eastward from the north-eastern side; Batu Addis, with a depth of 4 feet ($1^{m}2$), lies close to the outer end of this foul ground; elsewhere the island is steep-to.

May rock, with a depth of 18 feet ($5^{m}5$), lies 3 cables westward of Pulau Sarimbun.

Sarimbun rocks are two patches, which dry 7 feet ($2^{m}1$), lying on an extensive area of foul ground north-eastward of Pulau Sarimbun. The western rock is marked by a white beacon, situated about 2½ cables north-north-eastward of Pulau Sarimbun.

An isolated rocky patch, with a depth of 12 feet ($3^{m}7$), lies 1¼ cables north-eastward of the beacon.

Herald rock, with a depth of 18 feet ($5^{m}5$), lies about 3 cables eastward of Pulau Sarimbun, and one cable from the southern shore of the strait.

Horseshoe reef, over which there are depths of from 12 to 18 feet ($3^{m}7$ to $5^{m}5$), is a narrow ridge of rocks extending across the middle of the strait near the north-eastern end of Sarimbun rocks (*Lat. 1° 26′ N., Long. 104° 41′ E.*). Between the northern end of the reef and the northern shore of the strait there are several patches, with depths of from 14 to 18 feet ($4^{m}3$ to $5^{m}5$).

Sungei Malayu discharges into the north-western side of the strait;

Charts 2403, 795, 2757, 3543, 1355.

Chart 2587.

on the south-western entrance point, three-quarters of a mile north-eastward of Tanjong Setajam, there is a red cliff, 20 feet (6m1) high, and a village, and the coast is steep-to. About half a mile from the entrance, on the right bank of the river is a village and a pier, and the land in the vicinity is extensively cultivated.

On the south-eastern side of the strait, Sungei Perempan, an unimportant rivulet, discharges, and 1¼ miles farther north-eastward, is Sungei Buloh, and the islet of the same name at the mouth.

Dumping ground.—An ammunition dumping ground marked by a spherical buoy, is situated about 1¾ cables south-eastward of Tanjong Setajam (*Lat. 1° 27′ N., Long. 103° 41′ E.*).

Town reach.—Dangers.—Town reach extends from Putri narrows to the causeway. About 1¼ miles north-eastward of Sungei Malayu is Tanjong Danga, on which there is a bungalow belonging to the Sultan of Johore, and a small pier which dries alongside. Tanjong Danga is the southern and western entrance point, respectively of Sungei Danga and Sungei Skudai.

An extensive bank extends across the mouth of Sungei Danga, so that the channel into Sungei Skudai is well over on the northern shore of Town reach. The lunatic asylum and leper hospital are on the eastern shore of Sungei Skudai, where there is also a Malay village.

Charts 2587, 2586.

The land on the northern side of Town reach eastward of Sungei Skudai, consisting of two ranges of hills, on which are many houses and bungalows, is from 120 to 200 feet (36m6 to 61m0) high. The most conspicuous objects on the northern shore are the water tower, the Istana (principal residence of the Sultan), two tall flagstaffs, one at the Istana and the other about 3 cables west-north-westward, the Public Works Department's office (Malay college), the Supreme Court, and the Mosque with four domes. The Marine department depot is situated close westward of the Public Works Department's office, and has a wharf, with a depth of 10 feet (3m0) alongside; from here eastward to the causeway is a retaining wall.

On the southern side of the strait, between Tanjong Buloh and Sungei Kranji, about three-quarters of a mile south-eastward, the shore is bordered by dense mangroves and swamps.

Chart 2586.

Kampong Kranji stands about three-quarters of a mile eastward of the eastern entrance point of Sungei Kranji.

Woodlands, about 1¼ miles north-eastward of Kranji, is situated at the southern end of the causeway; the land in the vicinity has been partly cleared. The railway station is situated close to the causeway. There is a village close south-westward of the railway station.

Causeway shoal, over which there is a least depth of 16 feet (4m9), lies in mid-channel southward of the Istana; its eastern end is connected to the northern shore close westward of the causeway by a ridge, with depths of from 15 to 34 feet (4m6 to 10m4). A patch, with a depth of 19 feet (5m8), lies about one cable westward of the southern end of the causeway.

Causeway.—The causeway, which extends across the strait close eastward of Johore Bahru, carries a double railway track, a road, and a footpath. At the northern end there is a lock, 165 feet (50m3) long, 32 feet (9m8) wide at the gates, with a depth of 10 feet (3m0)

Charts 2403, 795, 2757, 3543, 1355.

Chart 2586.

on the sill at mean low water springs. Vessels not exceeding 140 feet ($42^{m}7$) in length can pass through the lock. A lifting bridge carries the rails and roadway over the lock.

Telegraph wires span the lock at a height of 80 feet ($24^{m}4$) above mean high water springs. The lock is under the control of the Federated Malay States Railways and is operated for the passage of lighters and small vessels between the hours of 0600 and 1800 daily.

Johore Bahru.—Johore Bahru, at the northern end of the causeway, is the capital of the State of Johore, the seat of the Government, and the residence of the Sultan.

There is railway communication with Singapore, the principal ports in the Malay peninsula and Bangkok.

Charts 2587, 2586, 2585.

Tidal streams.—In Johore strait, before the construction of the causeway, the tidal streams were mainly diurnal, as in the approach to Singapore, but now they are mainly semi-diurnal, that is to say, slack water generally occurs four times in each lunar day and the greatest variations in rate follow the moon's phases.

Though the stream is mainly semi-diurnal the diurnal effect is considerable; the rates given are average maximum rates, or average rates half the duration of the stream from its commencement. The tide falls from higher high water to lower low water or from lower high water to higher low water; the ebb stream, when the moon's declination is great, may therefore greatly exceed the rates given during the fall from higher high water to lower low water, and be less than the rates given during the fall from lower high water to higher low water; as the tide rises from higher low water to higher high water, or from lower low water to lower high water, the flood stream is not so greatly affected by diurnal differences in rate, but the rates of both flood and ebb streams are increased at high declination and decreased at low declination.

Owing to the number and size of the rivers discharging into the strait, the rate of the ebb stream is increased, and that of the flood stream decreased, during and after heavy rains.

(A) Western part of strait (observations obtained in mid-channel off Tanjong Kampong and in mid-channel in the narrows at Tanah Runtoh) (*Lat. 1° 25′ N., Long. 103° 40′ E.*).

The ebb stream runs from about one hour after high water at Singapore till about 5 hours before the following high water at an average maximum rate of 1·6 knots at springs and 0·8 at neaps. The flood stream runs from about 5 hours before high water at Singapore till about one hour after high water at an average maximum rate of 1·4 at springs and 0·7 knots at neaps. No appreciable differences were found in the rates of the stream at the two positions where observations were obtained; in Town reach the rate of the stream, especially of the flood, decreases as the causeway is approached.

(B) Eastern part of the strait, Calder harbour and Sungei Johore.

(*a*) Calder harbour, in mid-channel off Tanjong Pengelih:

The ebb stream runs from about the time of high water at Singapore till about 6¼ hours after high water, at an average maximum rate of about 1·2 knots; the flood stream runs from about 6¼ hours after high water till the time of

Charts 2403, 795, 2757, 3543, 1355.

the following high water at an average maximum rate of about one knot.

(*b*) Sungei Johore, in mid-channel between Tanjong Surat (*Lat. 1° 28′ N., Long. 104° 02′ E.*) and the shoal westward of it :

The ebb stream runs from about half an hour after high water at Singapore till about 5½ hours before the following high water at an average maximum rate of about 1·2 knots ; the flood stream runs from about 5½ hours before high water till half an hour after high water at an average maximum rate of one knot.

Note.—At the above positions the declination of the moon has nearly as much effect on the rate of the stream as its phases ; high declination or new or full moon increase the rate, low declination or quadrature decrease the rate. *See also* above for diurnal effect on the ebb stream.

(*c*) In mid-channel northward of Tanjong Changi (page 208).

The ebb stream at springs runs from about one hour after high water at Singapore till about 5 hours before the following high water at an average maximum rate of about 1·5 knots ; at neaps this stream runs almost continuously, at a variable rate which may reach 1·1 knots, but may be interrupted by a weak flood, or in-going, stream, for an hour or two before high water. The flood stream at springs runs from about 5 hours before till one hour after high water at Singapore at an average maximum rate of about 0·8 knots.

(*d*) In mid-channel about one mile east of Sungei Sembawang.

The ebb stream at springs runs from about the time of high water at Singapore till about 3 hours before the following high water at an average maximum rate of about 0·6 knots ; at neaps this stream runs almost continuously, except for an hour or two at about the time of high water, at an irregular rate which may reach 0·6 knots. There is no regular flood stream, though this may run with very low velocity for about 3 hours at springs and one to 2 hours at neaps before the time of high water at Singapore.

Observations above Sungei Sembawang have not been obtained, but it must be assumed that a weak, but continuous, ebb stream runs above that point.

Chart 2587.

Anchorages.—Anchorage may be obtained anywhere in Johore strait southward of Tanah Runtoh, but near Pulau Merambong, there is at times a heavy sea. If obliged to anchor in that vicinity the best berth is in a depth of about 24 feet (7^{m}3), about 3 cables west-south-westward of No. 28 beacon, which stands on Pulau Kampong.

The holding ground is generally good, being stiff mud and sand. Anchorage between Tanah Runtoh (*Lat. 1° 25′ N., Long. 103° 40′ E.*) and Horseshoe reef is not recommended, but farther eastward it can be obtained anywhere in stiff mud.

Chart 2586.

A convenient berth is in a depth of about 7½ fathoms (13^{m}7), about 1¼ cables southward of the Istana at Johore Bahru ; vessels should not proceed eastward of this on account of the eddies and tide-rips

Chart 2586.

caused by the causeway, and should be careful not to anchor in the vicinity of the telegraph cable, the track of which is shown on the chart.

Chart 2587.

Landing is easy everywhere, except between Tanjong Gul and Tanjong Kampong, where it is very exposed.

Directions.—After passing Sultan shoal lighthouse, keep the highest tree on Pulau Merambong in line with Woody hill, bearing 359° (view A on chart), passing eastward of Alert shoal, until No. 25 beacon bears about 046° ; a noticeable clump of casuarina trees will then be in line, bearing 010°, with a small tree on a nearly bare low hill (view B on chart) ; this will lead eastward of Pulau Merambong and Kolek rocks, in a depth of not less than 20 feet (6^{m}1). After passing Kolek rocks, haul eastward a little to clear Merambong spit, and bring the red cliff on Tanjong Bajau in line with a dip in the hills, bearing 033°, just westward of Bukit Pergam (view C on chart). Keep on this alignment until in the middle of the strait, when course may be altered to proceed in mid-channel. When Tanjong Bunga is abeam, haul over to the western side of the channel to avoid Lucy rock, and the foul ground off Pulau Pergam, after which the mid-channel course may be resumed, until after passing Tanah Runtoh.

Eastward of Tanah Runtoh there are three channels. North channel is the most direct and easiest, but should not be attempted by vessels of more than 14 feet (4^{m}3) draught. Middle channel is narrow and tortuous, but has the greatest depth in it and the marks are good. South channel is southward of Pulau Sarimbun and has a depth of 21 feet (6^{m}4), but it is narrow, and is not recommended.

Middle channel.—After passing Tanah Runtoh keep slightly over to the north-western side of the strait, and bring Sarimbun rocks beacon in line, with Johore water tower, bearing 058° (view D on chart). Steer on this line until abreast Pulau Sarimbun, when alter course to 093° for a wooden hut on a pier on the Singapore island side (view E on chart), allowing for the tidal stream. When the southern point of Pulau Sarimbun bears 239° and is just open of the land on the Singapore island side, south-westward of it (view F on chart), alter course to 060° to clear Horseshoe reef.

Charts 2587, 2586.

After passing Horseshoe reef, alter course northward and steer for the water tower, bearing 060°, until the Sultan's bungalow on Tanjong Danga bears 348°, when haul gradually eastward and steer 103° for the southern end of the causeway, anchoring as convenient, off the Istana.

Chart 2587.

North channel.—Follow the directions for Middle channel until clear of May rock, when haul northward, and pass midway between Sarimbun rocks beacon and Tanjong Setajam (*Lat. 1° 27′ N., Long. 103° 41′ E.*), with the water tower bearing 059°. Caution is necessary to guard against a set towards the foul ground southward.

Chart 2586.

EASTERN ENTRANCE.—The eastern entrance to Johore strait, between Tanjong Changi and Tanjong Kopok, 3 miles northward, is divided into two channels by Pulau Ubin ; the southern passage,

Chart 2586.

known as Selarang harbour, is the deeper and better; the northern is known as Nanas channel. The part of the strait westward of Pulau Ubin, between Tanjong Punggol, situated 6 miles west-north-westward of Tanjong Changi, and the causeway of Johore Bahru, is known as Tebrau reach.

The approaches to the eastern entrance have been described on page 209.

For tidal streams in the eastern entrance, *see* page 227.

Selarang harbour.—There are depths of over 7 fathoms ($12^{m}8$) in the fairway which in no part is less than 2 cables wide, and off the southern point of Pulau Ubin is as much as 4½ cables wide between the 6-fathom ($11^{m}0$) lines on either side. Several rivulets discharge into the harbour, the principal of which, Sungei Serangoon, is navigable by launches for a distance of nearly 2 miles to the village of the same name, where there is a Roman Catholic church and mission.

From the fairway, the land southward appears well wooded, and evidence of cultivation is not discernible except in the vicinity of Fairy point, situated about 1½ miles westward of the southern entrance point of the strait, and in places where coconut plantations exist; there are wooded hills near the southern shore for about 4 miles within the entrance, thence to the high land inside Tanjong Punggol the land is comparatively flat.

Conspicuous objects along the southern shore are:—Changi hill, 144 feet ($43^{m}9$) high; a tower about 1½ cables eastward of Fairy point; a water tower about three-quarters of a mile south-south-westward of Fairy point; a pier with a pavilion on its head about 1½ miles west-south-westward of the same point; and a tower one cable south-eastward of Tanjong Punggol.

Charts 2585, 2586.

Islands. — Dangers. — Buoyage. — Lights. — Beacons. — Pulau Ubin has been described on page 210.

There is a considerable amount of foul ground on the northern side of the entrance to Selarang harbour, formed by the banks and rocks which extend eastward and southward from the eastern end of Pulau Ubin. Depths of one fathom ($1^{m}8$) and less extend half a mile south-eastward from Tanjong Chek Jawa, and a small patch, with a depth of 5 feet ($1^{m}5$), lies one cable farther seaward.

Pulau Sekudu, is a rocky islet, 18 feet ($5^{m}5$) high, with some bushes on it, lying on a reef which dries, situated about 2½ cables south-westward of Tanjong Chek Jawa.

Malang Papan rock, which dries 8 feet ($2^{m}4$), lies 1¾ cables southward of Pulau Sekudu.

Malang Papan light (*Lat. 1° 24′ N., Long. 103° 59′ E.*) is exhibited, at an elevation of 20 feet ($6^{m}1$), from a white iron beacon, 15 feet ($4^{m}6$) in height, on Malang Papan rock.

A conical buoy, painted red, surmounted by a globe, known as Ubin buoy, is moored about 8 cables south-eastward of Tanjong Chek Jawa.

A light-buoy, painted black, known as Changi buoy, exhibiting a *red flashing* light *every five seconds*, is moored on the southern side of the strait, 4¾ cables southward of Malang Papan light-beacon.

Chart 2586.

Batu Puteh, 1¼ cables north-westward of Fairy point, is a group of grey granite rocks, the highest of which is 8 feet ($2^{m}4$) high; the

Chart 2586.

rocks have deep water around and between them. The tidal streams, particularly the east-going stream, run with considerable strength in the vicinity of these rocks.

A rock, which dries 4 feet ($1^{m}2$), surmounted by a concrete block, one foot ($0^{m}3$) high, lies about 11½ cables westward of Malang Papan light-beacon, and about one cable off the southern side of Pulau Ubin.

Fairy light is exhibited, at an elevation of 20 feet ($6^{m}1$), from a white iron beacon, 16 feet ($4^{m}9$) in height, on the eastern end of the rocks.

Loyang light is exhibited, at an elevation of 20 feet ($6^{m}1$), from a white concrete pile beacon, surmounted by a triangle, on the edge of the drying bank northward of Kampong Loyang, about 7 cables south-westward.

Squance bank, with a least depth of 10 feet ($3^{m}0$), extends southward and thence south-eastward from Tanjong Jelutong, the southern extremity of Pulau Ubin; the fairway between the 6-fathom ($11^{m}0$) line off this bank and Batu Puteh is about 1½ cables wide.

A conical light-buoy, painted red, known as Squance, exhibiting a *white flashing* light *every five seconds*, is moored about 2¾ cables west-north-westward of Fairy light-beacon. In 1946, the light was extinguished.

Pulau Ketam, a mangrove island, about 60 feet ($18^{m}3$) high to the tops of the trees, is separated from the south-western side of Pulau Ubin by Ketam channel.

A rock, which dries 2 feet ($0^{m}6$), lies about one cable south-eastward of the south-eastern point of Pulau Ketam.

In Ketam channel, near the south-eastern end, is Jones reef, which is marked by two white beacons. At the north-western end of the channel there are some reefs, and fishing stakes are laid across the entrance.

A light-buoy, painted black, known as Serangoon buoy, exhibiting a *red flashing* light *every five seconds*, is moored about half a mile south-westward of the north-western extremity of Pulau Ketam.

Tajam light is exhibited, at an elevation of 20 feet ($6^{m}1$), from a white iron beacon, 17 feet ($5^{m}2$) in height, close off Tanjong Tajam, the western extremity of Pulau Ubin.

On the southern side of the channel an extensive bank extends off the coast of Singapore island from about one mile south-eastward of the mouth of Sungei Serangoon to Tanjong Punggol. On this bank, about 8 cables south-eastward of Tanjong Punggol, is Pulau Serangoon, a mangrove island, about 75 feet ($22^{m}9$) high to the tops of the trees; the bank dries for a distance of 3 cables south-eastward from the island, and to within a quarter of a mile from Tanjong Punggol north-westward.

Punggol light (*Lat. 1° 25′ N., Long. 103° 55′ E.*) is exhibited, at an elevation of 31 feet ($9^{m}4$), from a white concrete pile close off Tanjong Punggol.

Anchorage.—Excellent anchorage may be obtained in any convenient depth in Selarang harbour, the holding ground being stiff mud.

Prohibited anchorage.—*See* page 211.

Nanas channel.—Dangers.—Buoys.—Beacons.—Nanas channel has a least navigable width of 1¾ cables in the Narrows, at the western end of the channel, and has a least depth in the fairway at the western

Charts 2403, 795, 2757, 3543, 1355.

Chart 2586.

end of the Narrows, of 21 feet (6^{m}4), but a vessel with local knowledge could carry a depth of 24 feet (7^{m}3).

Charts 2585, 2586.

A can buoy, painted black, named " Palai," and a conical buoy, painted red, named " Kopok," are moored 7½ cables and 11 cables, respectively, north-north-eastward of Tanjong Chek Jawa.

Henderson shoal, a middle ground at the eastern entrance of Nanas channel, has a least depth of 28 feet (8^{m}5), mud.

Chart 2586.

Pulau Nanas, on the northern side of the channel, 1¼ miles westward of Tanjong Kopok, is intersected with granite quarries and becomes conspicuous from south-eastward when it opens clear of the north-eastern point of Pulau Ubin, on account of the quarry at its eastern end which is covered by red soil.

A bank, which dries in places, extends 2¼ cables eastward from Pulau Nanas, and at its outer end is a rock 3 feet (0^{m}9) high. Some rocks, which dry 7 feet (2^{m}1), lie close off the south-western side of the island.

Dawes rock, which dries 3 feet (0^{m}9), is situated on a sunken coral reef, 1½ cables from the northern shore, and about 1½ miles westward of Pulau Nanas.

Tanjong Gemok, situated about 2¼ miles westward of Pulau Nanas, rises steeply to a round-topped hill, 60 feet (18^{m}3) high to the tops of the trees. A beacon stands close southward of the point, and another beacon stands close off the northern extremity of Pulau Ubin.

Fan shoal extends from the north-western side of Pulau Ubin across the western end of Nanas channel. There are depths of less than 18 feet (5^{m}5) for a distance of 2½ cables north-westward of Tanjong Tajam, thence the general depths over the shoal are from 24 to 30 feet (7^{m}3 to 9^{m}1), with the exception of a patch of from 21 to 22 feet (6^{m}4 to 6^{m}7) lying nearly in mid-channel on the eastern end of the shoal.

Pulau Tukang, about 70 feet (21^{m}3) high to the tops of the trees, lies close off the northern shore about 1¼ miles westward of Tanjong Gemok.

Tebrau reach.—Lights.—Dangers.—Beacons.—Buoyage.—A least depth of 38 feet (11^{m}6) can be carried from abreast Tanjong Punggol to the causeway at Johore Bahru. The western part of this reach, westward of the entrance to Sungei Tebrau, is known as Ordnance reach, and that part off the dockyard, Dockyard reach.

From the fairway of the strait the general appearance of the land is that of a densely wooded, undulating country fronted generally by mangroves, and in places by palm trees. Several rivulets flow into this reach. A few isolated tall trees are conspicuous.

Biru light (*Lat. 1° 26′ N., Long. 103° 55′ E.*) is exhibited, at an elevation of 30 feet (9^{m}1), from a white concrete pile beacon, surmounted by a triangle, on the northern shore, 4 cables westward of Pulau Tukong.

A red conical light-buoy, No. 6, known as Buloh, exhibiting a *white flashing* light *every five seconds*, is moored about 4½ cables south-westward of Biru light-beacon.

For about 4 miles north-westward of Tanjong Punggol the coast forms a bay into which several rivulets flow, and at the north-western end of the bay is Pulau Seletar, a mangrove island, about 80 feet (24^{m}4) high to the tops of the trees. From the north-eastern side of

Charts 2403, 795, 2757, 3543, 1355.

Chart 2586.

this island a narrow shoal of sand and mud, which dries in places, named Alang Perimbi, extends south-eastward, fronting the bay, to within one mile of Tanjong Punggol.

A light-buoy, painted yellow, known as Perimbi, exhibiting a *red flashing* light *every five seconds*, is moored on the north-eastern side of Alang Perimbi, about 1½ miles west-north-westward of Tanjong Punggol.

There is a pier on the southern shore about 2 miles westward of Tanjong Punggol, with a depth of 9 feet (2^{m}7) alongside, and a least depth of 8 feet (2^{m}4) in the approach from north-eastward. There are two small jetties, which dry alongside, situated about 5 and 7 cables, respectively, north-westward of the pier.

Seletar light is exhibited, at an elevation of 30 feet (9^{m}1), from a white concrete pile beacon, surmounted by a triangle, on the north-western extremity of Alang Perimbi.

Felkin spit, with depths of from 17 to 30 feet (5^{m}2 to 9^{m}1), is an extension of the shore bank north-westward of Pulau Seletar; its south-eastern end lies about 6 cables north-eastward of the south-eastern end of that island.

A black can light-buoy, known as Felkin, exhibiting a *red flashing* light *every five seconds,* is moored on the north-eastern side of Felkin spit, about 6 cables north-eastward of the north-western end of Pulau Seletar.

Off the northern shore of the strait, east-north-eastward of the northern extremity of Pulau Seletar, is a rocky patch with depths of from 10 to 17 feet (3^{m}0 to 5^{m}2), extending about 2 cables offshore; about 2 cables farther north-westward is the south-eastern extremity of a narrow bank, fronting the entrance to Sungei Masai, with depths of from 24 to 30 feet (7^{m}3 to 9^{m}1), about 4 cables from the coast which here recedes somewhat from the general line. A red conical buoy, surmounted by a staff and globe, No. 8, is moored near the south-eastern end of this bank, about 2¾ cables from the northern shore.

A beacon is situated close off the north-western end of Pulau Seletar and another one close off the southern shore, 6 cables farther north-westward.

Lavis shoal, with depths of from 4 to 17 feet (1^{m}2 to 5^{m}2), extends about 2 cables from the southern shore, about three-quarters of a mile north-westward of Pulau Seletar.

Prohibited anchorage.—There is a prohibited anchorage, indicated by pecked lines on the chart, south-westward of Perimbi light-buoy.

Dockyard reach. — Lights. — Dangers. — Buoyage. —A pier is situated on the southern shore about 1½ miles north-westward of Pulau Seletar. About 3½ cables farther north-westward is the Naval dockyard, which, in 1940, had a depth dredged to 39 feet (11^{m}9) alongside. A floating dock is moored close north-eastward of the dockyard jetty.

Lights are exhibited, each at an elevation of 21 feet (6^{m}4), from iron columns, 16 feet (4^{m}9) in height, at the West Stores basin (*Lat. 1° 28′ N., Long. 103° 50′ E.*) and the north-western corner of the dockyard jetty, respectively.

A light-buoy, painted black, exhibiting a *white flashing* light *every second,* is moored about 3 cables east-north-eastward of the light structure at the West Stores basin.

Charts 2403, 795, 2757, 3543, 1355.

Chart 2586.

A line of mooring buoys, lying parallel with the shore on the south-western side of the fairway, extends north-westward from abreast Lavis shoal.

Siniop light is exhibited, at an elevation of 20 feet ($6^{m}1$), from a white concrete pile beacon, surmounted by a triangle, on the edge of the shore bank on the northern side of the strait, about 1¼ miles northward of the north-western extremity of Pulau Seletar.

A house with a red roof, named Rumah Merah, known locally as the Red house, stands on piles close off the southern shore, 5½ cables westward of the light-structure on the north-western corner of the dockyard, and is conspicuous. Several can buoys are moored off Rumah Merah, the positions of which may best be seen on the chart.

Denman shoals, with a least depth of 4 feet ($1^{m}2$), is the name given to a rocky area westward of Rumah Merah, extending 3½ cables from the southern shore. A shoal, with a depth of 6 feet ($1^{m}8$), lies 2½ cables westward of Rumah Merah and about three-quarters of a cable offshore.

A can light-buoy, painted black, known as Denman buoy, is moored on the north-western edge of Denman shoals, about 6 cables west-north-westward of Rumah Merah.

A red bluff, 35 feet ($10^{m}7$) high, known as Red cliff, covered with grass and scrub, is situated on the northern shore, about 2 miles north-westward of Siniop light-beacon. Close within it is a conspicuous dome-shaped tree.

A 30-foot ($9^{m}1$) patch lies about 2 cables south-westward of Red cliff, and a bank, with a least depth of 31 feet ($9^{m}4$), lies close westward of the patch. Eastward of the patch are several isolated patches, with depths of from 28 to 36 feet ($8^{m}5$ to $11^{m}0$), lying within 2½ cables of the northern shore.

A conical light-buoy, painted green, exhibiting a *green flashing* light *every fifteen seconds*, is moored about 3 cables west-south-westward of Red cliff (*Lat. 1° 29′ N., Long. 103° 49′ E.*).

Sungei Tebrau flows into the northern side of the strait about 1½ miles westward of Red cliff. The eastern bank of the river is steep-to, and the channel is about three-quarters of a cable wide. Above Sungei Plintong, which flows into the eastern bank of Sungei Tebrau, about three-quarters of a mile within its entrance, the channel narrows and the depths decrease, and about three-quarters of a mile above their junction, Sungei Tebrau is only navigable by small craft with local knowledge.

Tebrau leading lights are exhibited, the front light at an elevation of 20 feet ($6^{m}1$) and the rear light at an elevation of 30 feet ($9^{m}1$), each from a white concrete pile beacon, surmounted by a triangle ; the front light is on the eastern side and the rear light on the western side of the entrance to Sungei Tebrau, and, in line, they bear 288½°.

Ordnance reach.—Beacons.—Shoal.—Lights.—There are two conspicuous buildings on the northern side of the strait, the Estana Pasir Plangi, a chocolate-coloured house with a small water-tower near it, situated 1½ miles north-eastward of the northern end of the causeway, and a large whitish-coloured house, known as the Zenana, standing at an elevation of about 100 feet ($30^{m}5$), about one mile northward of the causeway.

Two leading beacons are situated about 5¾ cables westward of the pier at Red cliff. The front beacon, known as Senibong beacon, stands

Charts 2403, 795, 2757, 3543, 1355.

nearly one cable offshore, and the rear beacon about 1½ cables north-eastward of it. In line they lead through the fairway in Ordnance reach.

Armaments jetty (*Lat. 1° 28′ N., Long. 103° 48′ E.*) with a **T**-head is situated on the south-eastern side of Ordnance reach, about 1½ miles north-eastward of the southern end of the causeway; it is marked by a light at each end of the **T**-head. There is a depth of 24 feet (7ᵐ3) alongside the jetty. About 1½ cables south-westward of the jetty is a trot of mooring buoys. Woodlands jetty, about 4 cables north-eastward of the southern end of the causeway, has a small obstruction close to the centre, with a depth of 16 feet (4ᵐ9) over it. There is a jetty about 2½ cables north-eastward of the southern end of the causeway; it was reported, in 1945, to be in a damaged condition.

There is a 25-foot (7ᵐ6) patch about 8 cables north-north-eastward of Woodlands jetty.

Anchorages.—Directions.—Anchorage may be obtained in any part of Tebrau reach where the depth is convenient outside the prohibited anchorage (page 233); the holding ground of sand and mud is very good.

A quarantine anchorage, the limits of which are indicated by pecked lines on the chart, is situated northward of Pulau Seletar.

If proceeding through the southern entrance keep the southern extremity of Pulau Ketam in line with the northern shoulder of Bukit Mandai, on Singapore island, bearing 273° (*see* view A on chart) until the pavilion on the pier west-south-westward of Fairy point bears 247°, when steer for it on that bearing. After passing southward of Squance light-buoy alter course north-westward and steer for Biru light-beacon, bearing 311°, until Seletar light-beacon is in line with the new water tower at the Naval base, bearing 290°; then keep on this alignment, passing southward of Buloh buoy and northward of Perimbi light-buoy. When Siniop light-beacon bears 317°, steer for it on that bearing, which leads north-eastward of Felkin buoy; when it is abeam steer for the conspicuous dome-shaped tree close within Red cliff, bearing 302° until the Tebrau leading light-beacons are in line, bearing 288½°; then keep on this alignment, which leads in mid-channel off the dockyard.

If proceeding to an anchorage off the causeway, when abeam of Rumah Merah steer to pass northward of Denman light-buoy, thence keep the Senibong leading beacons in line astern, bearing 053½°, which leads through the fairway in Ordnance reach, passing south-eastward of the 25-foot (7ᵐ6) patch situated about one mile from the causeway.

If entering the strait through Nanas channel, steer for Tanjong Kopok, bearing 340°, which leads in mid-channel to the entrance, thence pass northward of Henderson shoal, and thence keep in mid-channel, taking into consideration that Dawes rock and the reef extending from it lie about 2 cables from the northern shore, and a 25-foot (7ᵐ6) patch, which lies about 2 cables west-south-westward of Tanjong Gemok beacon.

The natural leading marks have in many cases disappeared or become overgrown, and have lost much of their value.

Tidal streams.—*See* page 227.

Charts 2403, 795, 2757, 3543, 1355.

CHAPTER VII

SUMATRA, WEST COAST—UJONG RAJA TO SINGKEL, AND OFF-LYING ISLANDS

Chart 2760.

GENERAL REMARKS.—Aspect.—In outward appearance the west coast of Atjeh, the northern portion of Sumatra, differs entirely from the north and east coasts. In the latter portions there is a considerable alluvial plain almost all along the coast, with here and there a chain of hills extending nearly to the sea, and with a regular coast line.

Between Ujong Masam Moeka (Muka) (*Lat. 5° 35′ N., Long. 95° 13′ E.*) and Pasi eilanden, about 60 miles southward, there are several bays, exposed to the South-west monsoon; southward of Pasi eilanden as far as Meulaboh (Mölaboh), a distance of about 45 miles, the coast is sandy, backed by a level row of trees, with no inlet excepting Lho Boebon (Bubon). Between Meulaboh and Singkel, about 150 miles south-eastward, the coast is generally rocky and the mountains approach it, the only low land being near the mouths of the rivers, as between Meulaboh and Soesoh (Susoh), about 50 miles south-eastward, and between Krueng Kloeët (Kluet), about 50 miles south-eastward of Soesoh, and Singkel.

An almost unbroken chain of mountains extends southward from Ujong Masam Moeka parallel to the coast, at a distance of from 6 to 8 miles.

There are many dangers off the coast, but northward of Ujong Radja (Raja), about 135 miles south-eastward of Ujong Raja (Raya), they do not extend to any great distance offshore; between that point and the Banjak (Banyak) eilanden, about 95 miles south-south-eastward, they extend from 5 to 15 miles offshore. Many of them are steep-to coral reefs, so that soundings will give no warning; a good look-out aloft should be kept during daylight, and vessels should proceed only at moderate speed when in the vicinity of dangers. Sounding, however, should not be neglected.

Landing.—Landing is generally difficult on account of the surf, and if obtainable the native boats should always be used.

During the North-east monsoon, however, good anchorage and smooth water may nearly always be found near the shore. This monsoon is the favourable one for trade and navigation.

Local weather.—*See* page 31.

Inhabitants.—The coastal inhabitants are Achinese, Pedirese, and Malays, and, in the mountains, Gayas and Alas; Malays are principally found southward of Soesoh.

Pilots.—Men possessing some local knowledge of the pilotage are

Charts 748b.

Chart 2760.

obtainable at most places on the coast, but too much dependence must not be placed on them. *See* also page 18.

Tidal streams.—Current.—The tidal streams off this coast are scarcely felt northward of Rigaïh baai (page 246); the stream sets mainly north-westward at a maximum rate of 2 knots near the 100-fathom ($182^{m}9$) line, where it is stronger than close inshore; it seldom sets south-eastward but may sometimes set onshore. Beyond a distance of 8 miles from the coast, the surface current caused by the wind attains a maximum rate of 1¼ knots with north-westerly winds and one knot with south-easterly winds, but these rates are seldom experienced.

Rivers.—The many small rivers discharging on this coast are all fronted with sand bars at the mouth and are navigable only by small craft with local knowledge. A few of the larger rivers, such as the Meureubo (Möröbo), Tripa, and Kloeët, are navigable over a fairly considerable length, but can only be entered by ships' boats in exceptional circumstances. During the South-west monsoon there are heavy breakers off the mouths of the rivers on the stretch of coast south-eastward of Meulaboh. After every freshet the channel over the bar shifts, which renders it necessary to obtain local knowledge before attempting to enter. The best time to enter is in the North-east monsoon during the first few days of the moon's first quarter; as the moon waxes so do the breakers increase, reaching their greatest force during the last few days of the moon's last quarter.

Charts 3869, 2777.

COAST.—The coast between Ujong Raja (*Lat. 5° 32′ N., Long. 95° 11′ E.*) and Rigaïh baai, 57 miles south-south-eastward, has many prominent headlands and is backed by mountains, but there is no secure anchorage during the South-west monsoon. The coast is rocky and steep between Ujong Raja and the northern entrance point of Krueng Raba baai, about 2½ miles south-eastward, southward of which there are sandy bays.

In most places the land rises sharply to the hills within; the principal exceptions are the low land at the head of Krueng Raba baai, which has often been mistaken for Aroïh Tjoet (page 46) by vessels approaching from westward, and the valley of the Krueng Lam Beusoë (Bösoe), 27 miles southward, which forms a conspicuous break in the Barisan gebergte.

Many sunken dangers lie near the coast, and it is advisable to give it a berth of about 6 miles, especially at night. Most of the dangers are steep-to, as is the coast in most places, but they can generally be distinguished by the surf breaking over them. Near the coast the bottom is mostly sand and coral, but in the vicinity of Ujong Raja it is mud, or mud and sand, in depths greater than 6½ fathoms ($11^{m}9$). Close inside the 100-fathom ($182^{m}9$) line, as far south as off the Pejaba (Peyaba) eilanden (page 245), are several patches, with depths of from 7 to 9 fathoms ($12^{m}8$ to $16^{m}5$), the positions of which can best be seen on the chart.

The holding ground almost everywhere is poor, and the heavy swell makes anchorage in most places on this part of the coast undesirable.

Chart 3869.

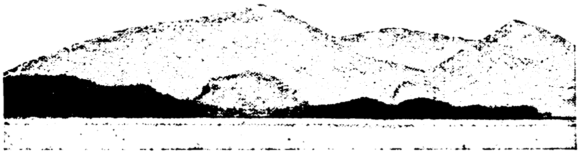
Mountains.—The following summits are useful marks when navi-

Chart 3869.

gating along this coast :—Gle Raja (Raya), 2,041 feet (622^{m}1) high, situated about 2½ miles eastward of Ujong Raja. *See* view facing page 239.

Salam, 5,325 feet (1623^{m}1) high, lies on the highest and southernmost part of a long ridge which slopes in a north-north-westerly direction to the gap of Lho Nga, situated about 4¾ miles east-south-eastward of Ujong Raja.

Close to the coast on the north-western and south-eastern sides, respectively, of Blang Raja (Raya) baai, about 15 miles southward of Ujong Raja, are Kareuëng (Karöeng), 682 feet (207^{m}9) high, and Kroeët (Kruet), 1,066 feet (324^{m}9) high, both of which are light green in colour and easily identified.



Kroeët, bearing 112°.
(*Original dated* 1902.)

Chart 2777.

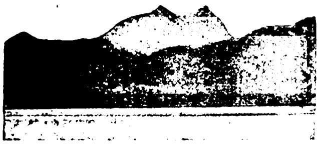
The Meukoerah (Mökurah) gebergte, with Bateë Meutjitja (Möchicha), its westernmost and most elevated summit, about 13 miles south-eastward of Salam, is 7,084 feet (2159^{m}2) high, and is visible from both the western and northern sides of Atjeh. About 6 miles westward of Bateë Meutjitja is Tjoepleh Boelat (Chupleh Bulat) (*Lat. 5° 13′ N., Long. 95° 24′ E.*) with its two peaks, 6,316 and 6,286 feet (1925^{m}1 and 1916^{m}0) high, a comparatively narrow ridge running north and south with a deep depression in the middle. *See* view facing page 244.

Gle Teumiga (Tömiga), a truncated cone, 951 feet (289^{m}9) high, is situated 26 miles southward of Ujong Raja, and is one of the best landmarks on the coast ; it lies on the northern side of Daja (Daya) baai, and falls steeply to the sea. *See* also on page 242.

Toendjoj (Tunjoy) or Raja (Raya), 1,916 feet (584^{m}0) high, lies about 2 miles inland and 12½ miles south-south-eastward of Gle Teumiga, and Panton Gadjah, 1,312 feet (399^{m}9) high, about 1¼ miles north-westward of Toendjoj. Both of these mountains have a regular conical shape.

Lam Beusoë (Bösoe) 4,820 feet (1469^{m}1) high, and cone-shaped, lies about 9 miles north-eastward of Toendjoj.

Sikawit, about 11 miles east-south-eastward of Lam Beusoë, has a very noticeable twin-peaked summit, 6,142 and 5,430 feet (1872^{m}1 and 1655^{m}1) high.



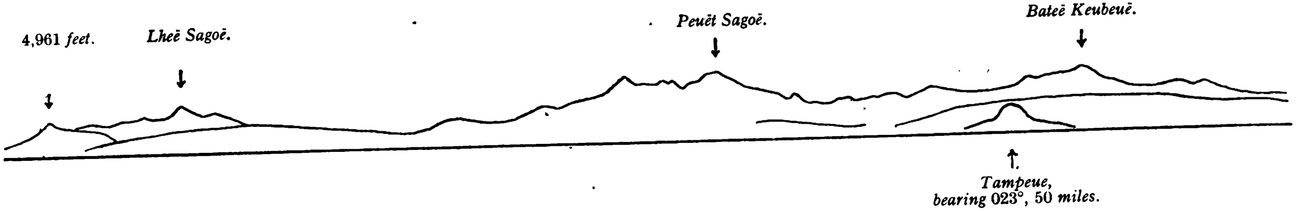
Sikawit, bearing 102°, 10 *miles.*
(*Original dated* 1902.)

Koeali (Kuali), 1,398 feet (426^{m}1) high, lies 1½ miles northward of the northern side of Rigaïh baai. From south-eastward it appears as an island in the shape of a cone ; from westward two summits are visible, the southern being the higher.

Sawah, 2,231 feet (680^{m}0) high, lies 6¼ miles east-north-eastward of Koeali and is very noticeable.

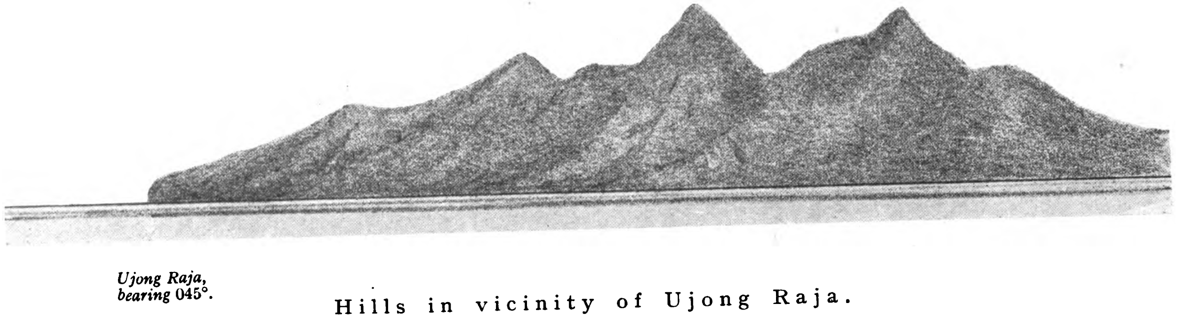
Charts 2760, 748b.

To face page 239.



South-western approach to Reede Meulaboh.

(*Original dated* 1929.)

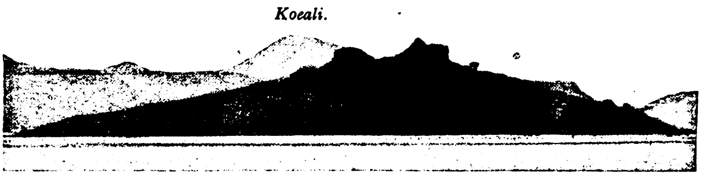


Hills in vicinity of Ujong Raja.

(*Original dated* 1902.)

Chart 2777.

The summit, 4,265 feet (1300^{m}0) high, about 17 miles eastward of Sawah, is shaped like a flattened cone, and is frequently clear of clouds until fairly late in the morning. The summit, 4,961 feet (1512^{m}1) high, situated about 9 miles north-eastward of the preceding mountain, has a very noticeable peak on its western side.



Koeali, bearing 090°, distant 8 miles.
(*Original dated* 1902.)

Tampeuë (Tampöe) (*Lat. 4° 35′ N., Long. 96° 19′ E.*), 3,691 feet (1125^{m}0) high, and shaped rather like a truncated cone, lies 19 miles south-eastward of the last mentioned summit, and 28 miles inland; it is usually difficult to identify. *See* view facing this page.

For the mountains farther southward, *see* page 251.

Chart 3869.

Coast.—Ujong Raja or King point is the termination of a high, steep, and rocky promontory, noticeable from all directions. *See* view facing this page.

Krueng Raba baai lies between two ranges of mountains. At its head, Krueng Raba discharges, and on its northern bank is the village of Lho Nga. The entrance to the river is difficult to identify.

A coral reef, which dries in places, fronts the mouth of the river and fringes the coast northward for a distance of 1½ miles, extending from about 1½ to 3 cables offshore. Its northern end forms the southern side of a cove at the northern end of the bay, where landing is possible in bad weather. Depths of less than 5 fathoms (9^{m}1) extend about half a mile north-westward from the northern end of the reef. Some rocks above water lie about 2 cables offshore, about 1¼ miles north-north-eastward of Ujong Ritieng, the southern entrance point of the bay.

A boat can enter the river by approaching from southward, keeping close inshore.

Ujong Ritieng is a precipitous headland with a rock above water close northward of it. The village of the same name stands on the creek southward of it.

Ritieng baai is entered between Ujong Ritieng and Ujong Poelot (Pulot), 4 miles southward. A narrow island, with a few coconut palms on it, lies close to and parallel with the head of the bay, being separated from it by Krueng Leupoeëng (Löpueng). The village of Leupoeëng stands near the southern end of the bay.

Seudoe (Södu) baai lies with its entrance between Ujong Poelot and Ujong Seudoe (Södu), 394 feet (120^{m}1) high, about one mile west-south-westward. A coral reef, with a rock above water on it, extends about 2 cables from the north-western side of the bay, and a reef extends about one cable from the eastern side.

Ujong Poelot is fairly steep-to, and is dominated by a hill, 387 feet (118^{m}0) high.

Charts 2760, 748b.

Chart 3869.

A good temporary anchorage may be obtained by small craft, in a depth of 6 fathoms ($11^{m}0$), with fair shelter from the south-westerly swell, with Ujong Seudoe bearing 277°, and Ujong Poelot, 056°.

About half a mile southward of Ujong Seudoe, a reef, on the outer end of which are some rocks above water, extends about a quarter of a mile westward. About 2¼ cables west-south-westward of these rocks is Batu Mandi, a group of two large rocks, 52 feet ($15^{m}8$) high, and some smaller ones; a navigable channel about 2¼ cables wide, with a depth of about 9 fathoms ($16^{m}5$), separates this group from the coast eastward.

Paroë baai lies with its northern entrance point about 1½ miles southward of Ujong Seudoe, and is about one mile wide at its entrance. Anchorage may be obtained in the bay, in depths of from 5 to 6 fathoms ($9^{m}1$ to $11^{m}0$). The southern side of the bay is fringed by a reef which extends a short distance offshore. Both entrance points are cliffy, but there is a sandy beach at the head.

Perling eilanden consist of several islands and rocks above and below water, extending from about 2 to 7 cables from Ujong Data, about 3¾ miles southward of Ujong Seudoe, with depths of from 7 to 10 fathoms ($12^{m}8$ to $18^{m}3$) between them and the main island. Klappa, 177 feet ($53^{m}9$) high near the middle of the group, and the south-easternmost island, 167 feet ($50^{m}9$) high, are both wooded and conspicuous.

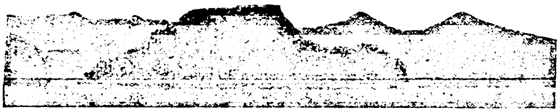
Off-lying reefs.—Aert van Nes, a coral patch, with a least depth of 6½ fathoms ($11^{m}9$), lies 4¾ miles west-north-westward of Ujong Ritieng.

Coehoorn, with a depth of 7 fathoms ($12^{m}8$), lies about 3¾ miles westward of Ujong Seudoe. Detached banks, with depths of from 7 to 9 fathoms ($12^{m}8$ to $16^{m}5$), lie eastward and south-eastward of Coehoorn.

Sindoro, an extensive coral patch, about 3½ miles west-north-westward of Klappa, has a least depth of 6½ fathoms ($11^{m}9$), and is steep-to.

These reefs are not marked by discolouration, but can be distinguished at times by a heavy swell over them.

Roesa.—**Light.**—Roesa (Rusa), a densely wooded island, lies about 1¾ miles southward of Klappa, and about a quarter of a mile offshore. It has a rugged coastline, and there is a sandy beach on the south-western side, where, near a group of coconut palms, landing may sometimes be effected.



Roesa, bearing 127°, distant 4 miles.

(*Original dated* 1902.)

In a heavy sea, the water for a considerable distance westward of the island becomes a light green colour, and gives the impression of there being a reef in the vicinity, but the island may be closely approached on all sides.

A light (*Lat. 5° 17′ N., Long. 95° 12′ E.*) is exhibited, at an elevation

Charts 2777, 2760, 748b.

Chart 3869.

of 252 feet (76^{m}8), from a white iron framework structure, 26 feet (7^{m}9) in height, on Roesa.

A group of rocks lies at the southern end of the passage between Roesa and the main island, and is marked by breakers, otherwise the channel is deep and clear of dangers.

The outer rock of the two large rocks of Batu Mandi, bearing about 007°, and open westward of Ujong Data, leads through the passage, which should only be used by vessels with local knowledge. The tidal stream sometimes sets on to the reef which fringes the south-eastern side of Roesa, which is well marked by discolouration.

Coast.—Blang Raja (Raya) baai lies with its north-western entrance point about one mile south-eastward of Roesa light-structure, and is about one mile wide at its entrance; both entrance points are precipitous. There is usually considerable surf in the northern part of the bay, where Krueng Kala discharges, and the best landing is then in the south-eastern corner.

For Kareuëng and Kroeët, two hills situated on the north-western and south-eastern sides, respectively, of Blang Raja baai, *see* page 238.

There is good holding ground in the middle of the bay, but a heavy swell generally prevails.

Chart 2777.

Loöng baai, close southward of Blang Raja baai, is too exposed to afford any good anchorage. Ujong Tandjong, its southern entrance point, is low. Lho Po Toelot lies at the southern end of the bay.

A rock, with a depth of 5 feet (1^{m}5), and which seldom uncovers, lies about 2 cables northward of Ujong Tandjong, with a depth of 8 fathoms (14^{m}6) between.

Ujong Poedeng (Pudeng) (*Lat. 5° 12′ N., Long. 95° 16′ E.*), about 2¼ miles south-eastward of Ujong Tandjong, is a low point with a reef extending about 4 cables south-eastward and 2½ cables westward from it. About 6 cables southward of the point is a shoal with a depth of 1¾ fathoms (3^{m}2), on which the sea usually breaks. Roesa island, bearing about 335°, open south-westward of Ujong Tandjong, leads south-westward of these dangers.

About 1½ miles east-south-eastward of Ujong Poedeng and about a quarter of a mile inland, is Goeha, a hill, 623 feet (189^{m}9) high, but it is difficult to distinguish against the high background.

Chart 3870, plan of Kluang, Daya and Lam Bösoe bays.

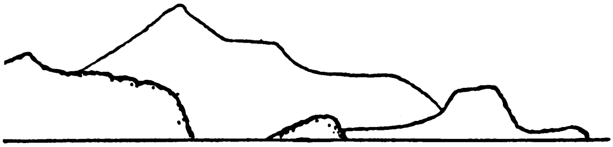
Kloeang baai.—Kloeang (Kluang) baai, entered between Ujong Sidagoeng (Sidagung), situated 4 miles south-south-eastward of Ujong Poedeng, and Ujong Tangkoera (Tangkura), about 2 miles south-westward, is exposed to north-westerly winds and does not afford a good anchorage; during the South-west monsoon there is a confused sea in the bay. Krueng Tandjong discharges into the eastern side of the bay.

Ujong Sidagoeng is a steep-to and rocky point. Ujong Tangkoera is the termination of a high and very noticeable promontory, joined to the mainland by an isthmus, which is covered with coconut palms. Between the two heads of the promontory there is a white sandy beach.

Kloeang (Kluang), a rocky, wooded islet, 427 feet (130^{m}1) high, lies about 2 cables northward of the northern side of the promontory, with a depth of 8 fathoms (14^{m}6) in the channel between. Small craft using this channel should keep close to the islet. On the north-eastern side of the islet, which is inhabited, there is a sandy beach with a reef.

A remarkable cave runs the whole length of the islet. There is much guano and edible nests on the islet.

Gle Teumiga, about 1¾ miles eastward of the extremity of Ujong Tangkoera, is described on page 238; a summit, 2,671 feet ($814^{m}1$) high, situated 5¼ miles east-north-eastward of the same point, has a sharp peak.



Kloeang baai.

(*Original dated* 1929.)

Off-lying reef.—Batu Boeroeng (Burung) (*Lat.* 5° 06′ *N.*, *Long.* 95° 16′ *E.*) consists of several rocks above water on a reef which nearly dries, lying half a mile westward of the southern head of Ujong Tangkoera. The passage between the reef and the promontory is deep and clear of danger.

Daja baai.—Danger.—Daja (Daya) baai is entered between the southern side of the promontory mentioned above and Ujong Po, 2 miles south-eastward. A reef, on the outer end of which is a noticeable rock, extends about 2 cables from the southern side of the promontory.

Anchorage may be obtained at the northern end of the bay, with the noticeable rock bearing 315° and Gle Teumiga, 045°, sheltered from north-westerly winds. *See* view facing page 244.

Ujong Po is cliffy, with a small round hill, 262 feet ($79^{m}9$) high, near its extremity, on which are some coconut palms. From a distance westward it appears to be an island. There are some rocks close off it, on which the sea constantly breaks.

A rock, with a depth of less than 6 feet ($1^{m}8$), lies 8 cables south-eastward of Ujong Po and 3½ cables offshore.

Lam Beusoë baai.—Dangers.—Lam Beusoë (Bösoe) baai is entered between a low point covered with coconut palms situated about 2½ miles south-eastward of Ujong Po, and Ujong Oenga (Unga), a similar distance farther south-eastward. Two rivers discharge into the bay, Krueng Lam Beusoë at the northern end, and Krueng Oenga at the southern end; the former only is of any importance, and it is the largest on this part of the coast. It rises in the Meukoerah gebergte (*see* page 238), and is navigable by small craft for a distance of about 4 miles; at its mouth is the village of Lam Beusoë. A stony ridge, which dries, extends about 2 cables southward from its western entrance point. There is a convenient landing northward of the village.

Limpan, a noticeable rocky islet, 151 feet ($46^{m}0$) high, with bare steep sides of red rock, lies on the outer end of the reef extending west-north-westward from Ujong Oenga. The summit of the islet is densely wooded.

Lam Beusoë rif, over which there is a least depth of 2¼ fathoms ($4^{m}1$) at its northern end, and on which the sea breaks, lies 6 cables westward of the north-western entrance point of Lam Beusoë baai. About

Chart 3870, plan of Kluang, Daya and Lam Bösoe bays.

6 cables southward of the southern end of Lam Beusoë rif is a shoal, with a least depth of 3½ fathoms ($6^{m}4$). Ujong Tangkoera in line with Gle Kareuëng (chart 3869), bearing 342°, leads westward of these dangers.

Peulintah (Pölintah), a reef, with a depth of less than 6 feet ($1^{m}8$), and on which the sea always breaks, lies about 3½ cables south-westward of Ujong Peulintah, a low point, difficult to identify, situated 1½ miles northward of Ujong Oenga.

About 3 cables southward of the western entrance point of Krueng Lam Beusoë is a rock with a depth of 2½ fathoms ($4^{m}6$), and southward of this danger the 6-fathom ($11^{m}0$) line extends 6½ cables offshore.

Anchorage.—Directions.—The anchorage in Lam Beusoë baai is indifferent, the bottom being rocky and the depths irregular; Lam Beusoë rif does not give any protection and the current from the river causes a vessel to lie broadside on to the swell. A temporary anchorage may be obtained, in a depth of about 6 fathoms ($11^{m}0$), about 7 cables westward of Ujong Peulintah (*Lat. 5° 02′ N., Long. 95° 21′ E.*).

On approaching Lam Beusoë baai, a vessel should steer for Limpan, bearing 090°, until the mouth of Krueng Lam Beusoë bears 000°, when she should steer for it on that bearing, which leads to the anchorage. Small craft with local knowledge may approach the anchorage through the passage eastward of Lam Beusoë rif, in a least depth of 6½ fathoms ($11^{m}9$).

If the mouth of the river cannot be distinguished the vessel should approach close to Limpan and thence steer about 338° until the breakers on Peulintah reef are sighted, and anchor in a depth of about 6½ fathoms ($11^{m}9$), with the reef bearing 090°.

Chart 2777.

Babah Awé baai and approaches.—Dangers.—Babah Awé baai is entered between Ujong Soebang (Subang), one mile southward of Ujong Oenga, and Ujong Babah Paroë, 3 miles farther southward. The shore is fringed for the greater part by a reef. Ujong Babah Paroë is low, with a coral reef extending about 1¾ cables westward from it.

Soebang (Subang), a reef over which there is a depth of 2 fathoms ($3^{m}7$), lies about three-quarters of a mile south-westward of Ujong Soebang. Ujong Tangkoera in line with Gle Kareuëng, bearing 342°, leads westward of this reef.

A reef, with a depth of 3¼ fathoms ($5^{m}9$) over its south-eastern end, lies about half a mile westward of Ujong Djinamprong, which is situated 1¾ miles south-south-eastward of Ujong Soebang.

Babah Paroë, a reef, with a least depth of 2¾ fathoms ($5^{m}0$), lies about 1¾ miles westward of Ujong Babah Paroë; the sea breaks on it only with a heavy swell. Ujong Tangkoera in line with Kroeët, bearing 346°, leads westward of the reef, and the north-eastern point of Raja (Raya) island in line with Koeali (page 238), bearing about 139°, leads south-westward of it.

Anchorage.—Directions.—A temporary anchorage may be obtained, in a depth of about 5 fathoms ($9^{m}1$), off Babah Awé village, situated at the head of the bay.

A vessel approaching from northward is recommended to pass outside Soebang reef; if from southward, she should pass eastward of Babah Paroë and steer for Limpan, bearing 355°, until Ujong Babah Paroë bears about 100°, when she should alter course north-eastward for the anchorage.

Charts 2777, 2760, 748b.

Chart 2777.

Coast.—Between Ujong Babah Paroë and Ujong No, about 1¾ miles southward, the coast is low, and fringed by a reef which extends about 2 cables offshore. Some rocks above water lie about midway between these points and about 4 cables offshore, and close southward of them is a rock with a depth of 2¼ fathoms ($4^{m}1$).

Raja baai.—Raja (Raya) baai, entered between Ujong No and the northern side of Raja, about 2½ miles southward, is one of the best anchorages on this coast ; although it is open westward it has good holding ground with depths of about 8 fathoms ($14^{m}6$). The head of the bay is fringed by a coral reef which extends a short distance, with rocks above water on it in places. There are two villages on the shores of the bay, Tjra Mong, situated on the northern side of the mouth of the river of the same name, which discharges about 2 miles south-south-eastward of Ujong No, and Lho Kroeët (Kruet), at the southern end.

Ujong No, although low-lying, is noticeable from north-westward ; the coastal reef continues from northward and extends about 1½ cables southward from the point.

Raja (Raya) (*Lat. 4° 52′ N., Long. 95° 22′ E.*) is a densely wooded island, about 328 feet ($100^{m}0$) high. Mané, about 3 feet ($0^{m}9$) high, is a yellowish sandstone rock, on which are a few coconut palms ; it lies on the reef which extends about 2 cables north-westward from the western extremity of Raja.

Chart 3870, plan of Raya strait.

Straat Raja.—Straat Raja (Raya), between Raja and the mainland, is about 3½ cables wide at its northern end. About midway between Ujong Kramat, the north-eastern point of Raja, and the main island eastward of it, is a ledge of rocks, over which there is a least depth of 3 feet ($0^{m}9$), which is seldom marked by discolouration ; this ledge divides the strait into two channels, the western being the wider and deeper, with depths of from 6 to 8 fathoms ($11^{m}0$ to $14^{m}6$) over a width of nearly one cable.

Ujong No in line with a small cone on the eastern slope of Gle Teumiga, bearing 342°, leads through the western channel in a depth of not less than 6½ fathoms ($11^{m}9$). If these marks are not visible, the strait is easy to navigate by eye, as the discolouration of the reef extending from the eastern side of Raja shows up well. The tidal stream is very weak. *See* view facing this page.

The point on the mainland eastward of Ujong Kramat is hilly and covered with coconut palms, and there are a few houses on the hill.

Lho Kroeët, a village on the eastern side of the northern entrance of the strait, is the seat of a Native District Chief.

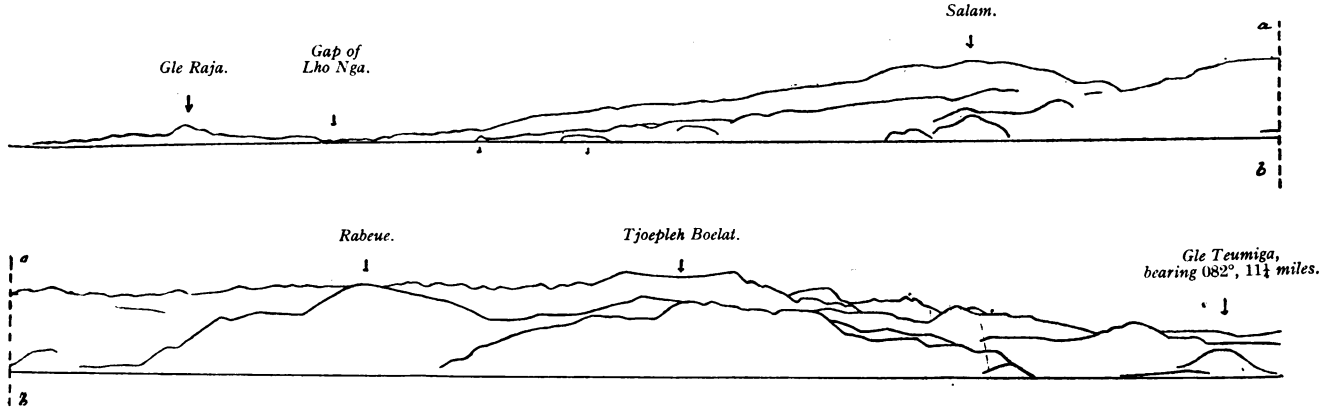
Anchorages.—Anchorage may be obtained anywhere in Raja baai. The best temporary berth is with the eastern extremity of Raja bearing 185°, and Mané, 261°.

During heavy westerly swells, the best position is in the southern entrance of Straat Raja.

Chart 2777.

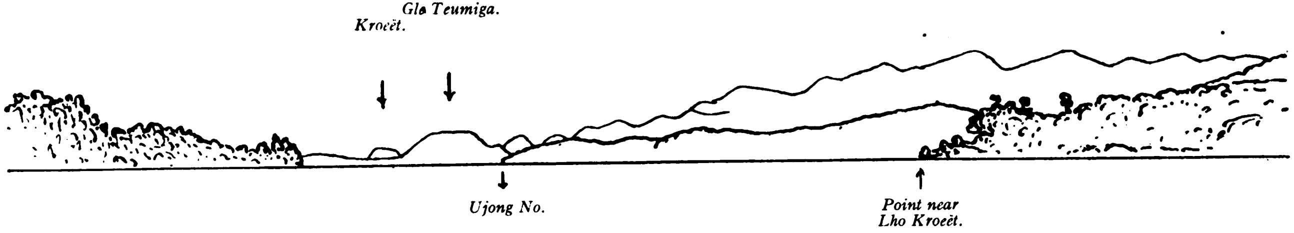
Coast.—Ujong Gla, about 3½ miles southward of Lho Kroeët, is a sparsely wooded, rocky point with precipitous sides and a rock above water close off its northern side. Foul ground extends about one cable from its southern side. The eastern extremity of Raja in line with the small cone on the eastern slope of Gle Teumiga, bearing 342°, leads westward of the dangers extending from Ujong Gla. The

To face page 244.



View, in two parts, of western approach to Daja baai.

(*Original dated* 1929.)



Ujong No in line with east fall of Teumiga, bearing 342°.

(*Original dated* 1929.)

shore of the bay lying between Lho Kroeët and Ujong Gla consists of low, red-coloured hills covered by coconut palms.

Babah Nipah village is situated at the mouth of a rivulet, about three-quarters of a mile eastward of Ujong Gla.

Ujong Meura, about one mile south-eastward of Ujong Gla, is low and clear of danger, but there are some rocks above water, within 1½ cables of the coast, between. For about one mile eastward of the point a reef extends about 2 cables offshore.

About 2¼ miles south-eastward of Ujong Meura is the village of Paté, and about 3½ cables north-westward of the village is Kiké, an islet with a few coconut palms on it, and some rocks above water extending about 3½ cables westward from it. A 4¾-fathom ($8^{m}7$) patch lies about a quarter of a mile west-north-westward of the outer rock.

Anchorage may be obtained, in a depth of 7 fathoms ($12^{m}8$), with the village bearing 077°, about half a mile offshore.

Keuëh (Köeh) (*Lat. 4° 46′ N., Long. 95° 27′ E.*), an island, 226 feet ($68^{m}9$) high and covered with coconut palms, lies about 2¼ miles south-south-eastward of Ujong Meura, and half a mile offshore. Its south-western side is cliffy and steep-to, but the remaining sides of the islands are fringed with a coral reef which extends half a cable offshore.

Keuëh, bearing 124°, distant 8 miles.

(*Original dated* 1902.)

Ujong Gunong Malem lies 3¾ miles south-eastward of Paté village, and close southward of the point Krueng Lageuën discharges. A rock, awash, lies close westward of it, and another about 2 cables south-south-eastward of it.

Pejaba (Peyaba) eilanden, about one mile south-westward of Ujong Gunong Malem, consist of two wooded islands, with a low, rocky, barren islet, nearly always covered in surf, lying about 1½ cables south-westward of the outer island. About 3 cables southward of the inner island is a rock, nearly awash, and about 1¼ cables north-north-eastward of the same island is a 2-fathom ($3^{m}7$) patch.

Kloëng is an island, 394 feet ($120^{m}1$) high, and densely wooded, lying about 3 cables offshore eastward of Pejaba eilanden. There is a least depth of 3¾ fathoms ($6^{m}9$) between Kloëng and the Sumatra coast, and from 7 to 9 fathoms ($12^{m}8$ to $16^{m}5$) between it and Pejaba eilanden.

Ujong Gloempang (Glumpang), about 2 miles southward of Ujong Gunong Malem, is a hilly point which may be approached closely on its western and northern sides, but on its southern side foul ground, with a rock above water on it, extends about 3½ cables southward.

Gloempang village is situated about 3½ cables eastward of Ujong Gloempang, but it is not visible from seaward. Landing here is seldom possible on account of the surf.

Tjikem (Chikem) eilanden are two densely wooded islands joined by a reef, situated about 1¼ miles southward of Ujong Gloempang, and

Chart 2777.

about three-quarters of a mile offshore. The larger and eastern island is high and steep, with a reef, on which are some rocks above water, extending about a quarter of a mile from its southern side.

Batu Broh are some noticeable black rocks lying about half a mile offshore eastward of Tjikem eilanden ; with any swell, the sea washes over them. There is a depth of 8 fathoms (14^{m}6) between them and the Tjikem eilanden.

About 2¾ miles south-south-eastward of Ujong Glumpang is Raneuë village, which may be identified by its coconut palms. About a quarter of a mile northward of the village is a landing place, marked by a boathouse, approached through a narrow passage in the coastal reef, but with any swell, landing is difficult.

Charts 3870, plan of Rigaïh and Chalang bays, 2777.

Teungkoe Meuse (Töngku Möse) is a densely wooded rocky islet lying on the coastal reef about 3½ cables south-south-westward of Raneuë ; it is difficult to distinguish against the background of the coast. Between the point eastward of this islet and Ujong Baro, about 1¼ miles southward, is a bight filled with reef. A rock above water lies about 6 cables offshore and half a mile south-south-eastward of Teungkoe Meuse.

Off-lying island and dangers.—Gillis, a reef with a depth of 2 fathoms (3^{m}7), lies 8½ cables west-south-westward of Teungkoe Meuse ; it is occasionally marked by breakers. The channel betweenf he reet and the islet is clear of danger.

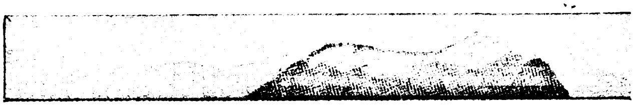
Ujong Gla, bearing 328°, open south-westward of Keuëh, leads half a mile south-westward of Gillis ; Ujong Gloempang in line with Toendjoj, bearing 338°, leads eastward of it, and Teungkoe Meuse in line with Koeali, bearing about 047°, leads south-eastward.

Rangas (*Lat. 4° 38′ N., Long. 95° 31′ E.*), 217 feet (66^{m}1) high, and densely wooded, is a noticeable island lying about 1½ miles south-westward of Ujong Baro. There is a high tree on its northern extremity, which is visible from a considerable distance. A sunken rock, on which the sea always breaks, lies half a cable off the north-western point, and two rocks above water lie off the south-eastern side, all of which are steep-to. A rock, above water, lies 4½ cables east-south-eastward of Rangas.

Reusamrots (Rösam rocks), above water and steep-to, lie about one mile south-south-eastward of Ujong Baro. A 3-fathom (5^{m}5) patch lies 2¼ cables north-north-westward of Reusamrots, and a 3¼-fathom (5^{m}9) patch 1¾ cables northward of them ; both are steep-to.

Rigaïh baai.—Dangers.—Rigaïh baai, entered between Ujong Baro and Ujong Djahoe (Jahu), 2 miles south-eastward, is of little importance to shipping, as Tjalang (Chalang) baai, just southward of it, affords a better sheltered anchorage.

Ujong Baro is a rocky headland rising steeply from the sea, covered with vegetation, and higher than the land within it.



Ujong Baro, bearing 095°.
(*Original dated* 1902.

Charts 2760, 748b.

Charts 3870, plan of Rigaih and Chalang bays, 2777.

Ujong Djahoe and Keban, about three-quarters of a mile north-eastward of it, are steep-to rocky promontories, covered with trees, and 292 and 400 feet (89^{m}0 and 121^{m}9) high, respectively.

The shore of the bay is for the most part composed of rocky cliffs, except the swampy portion on its north-eastern side. Krueng Rigaïh discharges into the northern part of the bay.

Reusam (Rösam) and Eunggang (Önggang), the latter of which is 197 feet (60^{m}0) high, and both covered with coconut palms and uninhabited, lie in the entrance to the bay. Within these islands are the low rocky islets of Beugaseh (Bögaseh) and Semoet (Semut), covered with trees and brushwood ; they all lie, with the exception of Reusam, within the edge of the coral reef, with depths of less than 3 fathoms (5^{m}5) and dry in places, which fills the inner and greater part of the bay.

A reef, with a depth of 2½ fathoms (4^{m}6), lies a quarter of a mile south-westward of the southern end of Reusam, and a reef with depths of 2 and 3 fathoms (3^{m}7 and 5^{m}5), lies about 1¾ cables from the western side. A 2-fathom (3^{m}7) patch lies 3¼ cables southward of the south-eastern extremity of the island.

Anchorages.—Directions.—Vessels may obtain anchorage in mid-channel between the northern extremity of Reusam and Ujong Rambong, northward of it, and should approach with the northern extremity of Reusam in line with the northern extremity of Semoet, or in mid-channel eastward of Eunggang, in a depth of 6 fathoms (11^{m}0). In approaching the latter anchorage, a vessel should pass close to Ujong Djahoe with Semoet just open of the eastern side of Eunggang (*Lat. 4° 38′ N., Long. 95° 34′ E.*).

A vessel approaching from northward, after passing outside Tjikem eilanden, should keep Ujong Baro in line with Ujong Djahoe, bearing about 132°, until the landing place northward of Raneuë village bears 090°, when she should steer for it on that bearing. If proceeding from Rigaïh baai to this anchorage she should pass Reusamrots on a north-westerly course and continue on it until Koeali is in line with Teungkoe Meuse, bearing 047°, when she should keep on this alignment until Ujong Baro is in line with the southern extremity of Reusam, bearing about 120°, when she should steer 000° until the landing place northward of Raneuë bears 090°, when she should steer for it on that bearing, which will lead to the anchorage.

Current.—Northward of Rigaïh baai the current sets mainly north-westward, and near the 100-fathom (182^{m}9) line runs stronger than close inshore ; it may attain a rate of 2 knots. A south-easterly set is rare. The possibility of being set in should be borne in mind.

Pasi eilanden.—Dangers.—Buoy.—Pasi eilanden consist of two groups of uninhabited, densely wooded islands in the southern approach to Tjalang baai. The western group consists of four rocky islets, lying on the same reef, of which Pasi besar, 131 feet (39^{m}9) high, is the largest and southernmost, and is situated 6 cables south-westward of Ujong Tjalang, the western entrance point of Tjalang baai. Close off the western side of Pasi besar is a reef on which are some rocks above water, and about 3½ cables south-westward of the islet is a rock above water. A rock, which dries, lies 4 cables north-north-westward of the islet, and a 2-fathom patch, 2½ cables northward. Vessels should not use the channel north-eastward of Pasi besar.

Pasi kechil, the northernmost islet of the eastern group, is a rock,

Charts 2760, 748b.

Charts 3870, plan of Rigaih and Chalang bays, 2777.

157 feet (47ᵐ8) high, lying 4½ cables east-south-eastward of Pasi besar. Close northward of Pasi kechil is a reef which dries, and about 2¾ cables north-eastward of the islet is Longkap Koeda (Kuda), a reef, composed of sand and coral, with a depth of 3 feet (0ᵐ9), and marked on its north-eastern side by a black can buoy.

In the passage between the two groups there is a general depth of 9 fathoms (16ᵐ5), but in the northern part of it there is a patch with a depth of 1¼ fathoms (2ᵐ3), and another with a depth of 3¼ fathoms (5ᵐ9), about one cable westward of it.

Tjalang baai.—Light.—Dangers.—Buoy.—Tjalang (Chalang) baai is separated from Rigaïh baai by the peninsula of which Ujong Djahoe and Ujong Tjalang (Chalang) are the western and south-eastern extremities, respectively. The latter point is 144 feet (43ᵐ9) high, and densely wooded.

The limits of the roadstead are imaginary lines drawn in 160° and 065° directions from Ujong Tjalang and the southern point of Pasi besar, respectively.

A 2½-fathom (4ᵐ6) patch lies about 1¾ cables east-south-eastward of Ujong Tjalang. Longkap Babalok, a reef, with a depth of one fathom (1ᵐ8), lies 2 cables east-north-eastward of Ujong Tjalang, and is marked on its north-eastern side by a black can buoy. A 2-fathom (3ᵐ7) patch lies 8½ cables eastward of Ujong Tjalang, and 4 cables offshore; between it and the northern shore there is a 4-foot (1ᵐ2) patch.

A light is exhibited, at an elevation of 20 feet (6ᵐ1), from the head of the pier, situated 2¾ cables northward of Ujong Tjalang.

Anchorage.—Directions.—Vessels may obtain anchorage with good holding ground, in a depth of 4¼ fathoms (7ᵐ8), sand, northward of Longkap Babalok, with Ujong Tjalang bearing 217° and the head of the pier, 274°. The best berth outside the bay is in a depth of 6 fathoms (11ᵐ0), sand, with the point, situated about 3 cables southward of Ujong Djahoe, bearing 287°, and the islet eastward of Pasir kechil, 198°.

To enter Tjalang baai a vessel should keep the 443-foot (135ᵐ0) summit of Keban in line with Koeali, bearing 330°, until the head of the pier bears 274°, when she should steer for it on that bearing, which will lead to the anchorage inside the bay.

Small craft with local knowledge approaching from westward usually pass between Pasi besar and Pasi kechil, keeping close under the former and thence close to Ujong Tjalang so as to avoid the 2½-fathom (4ᵐ6) patch and Longkap Babalok eastward of that point.

Tjalang.—Tjalang is the residence of an Administrator. A medical officer is attached to the settlement.

There is regular communication by steamer with other ports in Sumatra.

Chart 2777.

Coast.—Dangers.—Between Tjalang baai and Meulaboh (Mölaboh) (*Lat. 4° 08′ N., Long. 96° 08′ E.*), 45 miles south-eastward, the coast is low with flat land stretching a great distance inland. There are no off-lying dangers on this part of the coast, and the depths are regular, but it is recommended not to get inside the 10-fathom (18ᵐ3) line at night, as within this depth soundings give little warning of being close inshore.

In the offing between Tjalang and Ujong Toeba (Tuba), about

Charts 2760, 748b.

Chart 2777.

38 miles south-eastward, the hills and mountain summits lying some distance inland and extending in a north-westerly and south-easterly direction, can only be distinguished in the early morning. For conspicuous summits in this vicinity, *see* page 238.

This part of the coast is very uniform and without any conspicuous features in the foreground. Between the mouth of Krueng Panga, situated 10½ miles south-eastward of Tjalang, and a position just northward of the mouth of Krueng Wojla (Woila), 19 miles farther south-eastward, there is a uniform row of casuarina trees standing immediately behind the narrow sandy beach. The river mouths are difficult to identify even at a short distance.

Krueng Teunom (Tönom) discharges through two mouths about 2 miles apart, the north-western of which is about 7½ miles south-eastward of the mouth of Krueng Panga ; there is no channel into either entrance. The channel at the mouth of Krueng Wojla is very liable to shift, is very shallow, and is usually unapproachable by boats on account of the surf. Arongan village stands on the almost barren sand spit on the southern side of the entrance. About one mile north-eastward of the village is a conspicuous tree, visible from east, through north, to north-west.

Between Kuala Wojla and Ujong Toeba there is an unbroken row of trees of even height along the narrow sandy beach. Ujong Toeba is low, but covered with high coconut palms. There is a wreck on the coastal reef on the western side of the point, which is a good mark.

Karang Mayang, a reef, with a depth of 4¼ fathoms ($7^{m}8$), and which does not break, lies 1¼ miles westward of Ujong Toeba.

Lho Boebon (Bubon), on the eastern side of Ujong Toeba, affords good anchorage, in a depth of 5 fathoms ($9^{m}1$), sheltered from winds from west-south-west, through north, to east. The village of the same name stands on the western side of the bay, and in it there is a conspicuous white house with a zinc roof, off which is the landing place.

Krueng Boebon (Bubon), over which there is a noticeable iron bridge, discharges on the northern side of the bay.

A coral reef, which partly dries, extends 4 cables south-eastward from Ujong Toeba, and continues along the western shore of the bay as far as the village.

A reef, with a depth of 2½ fathoms ($4^{m}6$), lies about three-quarters of a mile south-eastward of Ujong Toeba, and another reef, with a depth of 1¾ fathoms ($3^{m}2$), lies about three-quarters of a mile eastward of the point ; these reefs are usually marked by breakers.

The coast between Ujong Toeba (*Lat. 4° 12′ N., Long. 96° 01′ E.*) and Ujong Kareuëng (Karöeng), 7½ miles south-eastward, is swampy ; there are two noticeable trees standing on this coast about 2½ and 3 miles, respectively, south-eastward of the mouth of Krueng Boebon, and standing on the right bank of Soea Oedjoeng (Sua Ujong) Kala, situated 6½ miles south-eastward of Ujong Toeba, is the cone-shaped monument of Teukoe Oemar.

Chart 3870, plan of Mõlaboh road.

Reede Meulaboh.—Lights.—Reede Meulaboh (Mölaboh), though of the same shape and nearly the same extent as Lho Boebon, affords less protection, there being no reefs seaward as at that anchorage. It is situated on the eastern side of a peninsula, the extremity of which is Ujong Kareuëng.

Charts 2760, 748b.

Chart 3870, plan of Mõlaboh road.

The shore of the bay is fringed by a reef which extends half a cable offshore across Kuala Tjangkoel (Changkul), the western mouth of Meureubo (Möröbo) rivier, on the western side of the bay. On the eastern side of the bay is Kuala Meureubo, which is navigable for craft which can cross its bar, as far as Mareue village, about 5½ miles up from the mouth of the Tjangkoel rivier, and at times to Peureumeuë village, 4 miles farther.

There are two jetties with **T**-heads, situated southward of Kuala Tjangkoel.

Ujong Kareuëng is a low point sparsely covered with coconut palms, from which a reef extends about one cable southward and from both sides of the peninsula. Ujong Geudong (Gödong), about 6 cables north-north-eastward of Ujong Kareuëng, is fringed by a reef, which extends about one cable south-eastward.

A light is exhibited, at an elevation of 47 feet ($14^{m}3$), from a white iron framework structure, 42 feet ($12^{m}8$) in height, on Ujong Kareuëng.

A light is exhibited on Ujong Geudong and from the head of the southern jetty at Meulaboh.

The limits of the roadstead are imaginary lines drawn in a 135° direction from Ujong Kareuëng and in a 247° direction from a point on the eastern side of the road eastward of Ujong Kareuëng.

Off-lying dangers.—Several dangers, marked by breakers, lie in the western approach to Reede Meulaboh. A reef, with a depth of 2 fathoms ($3^{m}7$), lies 1½ miles north-westward of Ujong Kareuëng and about half a mile offshore. About 6 cables south-south-westward of this reef, is a 2¾-fathom ($5^{m}0$) patch. About 7 cables westward of the point is a 1¾-fathom ($3^{m}2$) patch, with a similar patch close northward of it. Between these patches and the western side of the peninsula is a reef with a least depth of 1¼ fathoms ($2^{m}3$). Gusong Loengkap rajeu (Lungkap rayö), with a least depth of 1¾ fathoms ($3^{m}2$), lies about 3½ cables south-westward of the point.

Anchorage.—Directions.—Anchorage may be obtained, in a depth of about 4¼ fathoms ($7^{m}8$), sand and mud, with the flagstaff close north-westward of Ujong Geudong, bearing 268°, and the light-structure on Ujong Kareuëng, 229°. It is exposed to winds between south-west and south-east and the holding ground is bad; vessels should be ready to leave at short notice.

A vessel approaching from westward can round the reefs off Ujong Kareuëng by eye, as they are marked by breakers. When Ujong Geudong is open of Ujong Kareuëng, she may steer for the anchorage, rounding the latter point at a distance of about three-quarters of a mile. Approaching from southward the zinc roofs of the village are visible from a considerable distance.

Meulaboh.—Meulaboh, situated on the western side of the bay, is the residence of an Assistant Resident. It is the depôt and shipping port for pepper and timber products.

There is a resident medical officer.

There are two small cranes on the pier.

There is regular communication by steamer with other ports in Sumatra.

Chart 2777.

Coast.—Between Meulaboh (*Lat. 4° 08′ N., Long. 96° 08′ E.*) and Ujong Radja (Raja), 34 miles south-eastward, the coast is low, with

Chart 2777.

high trees behind. There are no off-lying dangers and the soundings give good warning of approach to the coast. Between Meulaboh and Singkel (page 278) earthquake shocks are sometimes experienced.

Aspect.—The mountains lie far inland and are only visible in the early morning. Abong Abong, 9,792 feet (2984$^{\mathrm{m}}$6) high, lies about 35 miles north-north-eastward of Ujong Radja; it is a slightly curved dome-shaped summit, only distinguished from the mountains in the vicinity by its great height. Geureudong (Görödong), 5,814 feet (1772$^{\mathrm{m}}$1) high, lies 10 miles south-westward of Abong Abong; it appears as a cone from westward, and is the only active volcano in this part of the island. About 4½ miles north-westward of Geureudong is a summit, 4,754 feet (1449$^{\mathrm{m}}$0) high, which is difficult to identify, but 2 miles westward of the latter is a peak, 3,632 feet (1107$^{\mathrm{m}}$0) high, which appears conical-shaped from southward.

With favourable conditions, several mountains near the north coast of Sumatra are visible in the early morning as far south as off Meulaboh, particularly Bateë Keubeuë (Köböe), 9,154 feet (2790$^{\mathrm{m}}$1) high, situated 21 miles southward of Ujong Radja (page 57) on the north coast; Peuët (Pöet) Sagoë, 9,252 feet (2820$^{\mathrm{m}}$0) high, about 9 miles westward of Bateë Keubeuë; and Lheë Sagoë, 7,602 feet (2317$^{\mathrm{m}}$1) high, about 13 miles west-north-westward of Peuët Sagoë (*Lat. 4° 55′ N., Long. 96° 19′ E.*). *See* view facing page 239.

Coast.—The mouths of the larger rivers on this coast show up as openings or depressions on the edge of the forest along the sandy coast. *See* also page 237. The stream from these rivers gives the water a muddy appearance for some distance offshore.

Krueng Seunagan (Sönagan) discharges 8½ miles south-eastward of Meulaboh, and has a well-defined clump of high casuarina trees, with a level top, on the southern side of its mouth, which is named Kuala Toea. About 3½ miles north-westward of Kuala Toea is Aron Toebai (Tubai), where there is another noticeable clump of high casuarina trees, which has a rounded top.

Charts 2777, 2778.

Krueng Tripa discharges through two mouths, the north-western of which is situated 12 miles south-eastward of Kuala Toea, and the south-eastern, named Kuala Sikandang Rajeu (Rajö), 4 miles farther south-eastward. Tripa village stands on the north-western bank of the north-western mouth. Both mouths are fronted by bars, and it is seldom possible to enter.

Kuala Seuneuam (Sönöam), about 8 miles south-eastward of Kuala Sikandang Rajeu, is unimportant.

Ujong Radja is a low sandy point with a grove of casuarina trees which extends to Kuala Seuneuam on the west, and to Kuala Lho Reuë (Röe), about 1½ miles eastward.

Tidal streams.—Current.—Between Ujong Radja and Singkel there are no tidal streams. Outside a distance of 8 miles from the coast the maximum rate of the south-easterly current caused by the wind is about 1½ knots, except during strong north-westerly winds, and of the north-westerly current one knot. The maximum rates are, however, seldom reached. Nearer the coast the current is still weaker.

Off the coast abreast Ujong Radja, the current sets north-westward from January to July at a maximum rate of one knot; at 10 miles

Charts 2760, 748b.

Charts 2777, 2778.

from the coast it sets south-eastward in most months at a rate of about half a knot.

Chart 2778.

Off-lying dangers.—From a position about 12½ miles south-westward of Ujong Radja to a position 4 miles westward of Tapa Toean (Tuan) light-structure, a distance of about 50 miles, there are many shoal patches with depths of from 4½ to 7 fathoms ($7^{m}8$ to $12^{m}8$) close inside the 100-fathom ($182^{m}9$) line, and thence to the coast there are numerous patches with even less depths, the positions of which can best be seen on the chart. Those reefs off the coast between Ujong Radja (*Lat. 3° 44′ N., Long. 96° 31′ E.*) and Singkel seldom show by breakers or discolouration. For the shoals outside the 100-fathom ($182^{m}9$) line west-south-westward of Tapa Toean, *see* page 256.

Charts 2777, 2778.

Coast.—Dangers.—There is a noticeable tree with a bare trunk and a small head, situated about 1¼ miles eastward of Kuala Soerian (Surien), 8 miles eastward of Ujong Radja. Between Kuala Lama Toeha (Tuha), 2½ miles eastward of Kuala Soerien, and Kuala Lama Moeda (Muda), 2 miles farther, there is a row of casuarina trees. Ujong Aroen (Arun), about one mile eastward of Kuala Lama Moeda, is low and can be easily identified by a long row of high casuarina trees extending westward from it.

Southward and south-eastward of Kuala Soerien there are several patches with a least depth of 2½ fathoms ($4^{m}6$), lying within 1¾ miles of the coast, and southward of Ujong Aroen, and in the south-western approach to Reede Soesoh (Susoh), there are several patches, with depths of from 2½ to 5 fathoms ($4^{m}6$ to $9^{m}1$), the outer ones being marked by breakers in a heavy sea.

Caution.—The nature of the bottom changes completely south-eastward of Ujong Radja; whereas north-westward of it the depths decrease regularly, south-eastward of it the depths are irregular, and considerable depths are found close to dangerous shoals. Sounding, however, should not be neglected, and a good look-out aloft should always be kept during daylight. Navigation during the hours of darkness, or with low visibility, is attended with considerable risk.

Aspect.—Loser, lying 21½ miles eastward of Soesoh village (*see* below), has two sharp peaks, the north-eastern of which is 11,093 feet ($3381^{m}1$) high; from south-westward it appears as a saddle. (*See* view facing page 260.) The summits 9,990 feet (3045^{m}) high, and 5,030 feet ($1533^{m}1$) high, lying about 4 miles south-south-eastward and 12½ miles southward, respectively, of Loser, have flat tops.

Nearer the coast are the following peaks:—

Soesoh (Susoh), 3,681 feet ($1122^{m}0$) high and dome-shaped, lies near the south-eastern end of a ridge which extends about 13 miles in a north-westerly and south-easterly direction, the south-eastern end of which lies 6¼ miles north-eastward of Soesoh village.

Koeta (Kuta) Tinggi, 518 feet ($157^{m}9$) high, lies about 3 miles north-eastward of Soesoh village, and about 1¾ miles east-south-eastward of Koeta Tinggi is Djeuloeh (Jöluh), 1,338 feet ($407^{m}8$) high, which is difficult to identify.

Soea, 262 feet ($79^{m}9$) high, lies about 3¼ miles eastward of Soesoh village, and is very distinct on account of its light green colour and dome shape. About 3½ miles east-south-eastward of Soea is Tangan

Charts 2760, 748b.

Charts 2777, 2778.

Tangan Rajeu (Rayö), 2,388 feet ($727^{m}9$) high; it is of a very dark colour and dome-shaped, and is easily identified from all directions.

Soea Niboeng (Sua Nibung), 2,779 feet ($847^{m}0$) high, lies 5 miles south-eastward of Tangan Tangan Rajeu; from westward it appears as a fairly sharp cone. The peak 4,761 feet ($1451^{m}2$) high, lying 2½ miles north-eastward of Soea Niboeng, is cone-shaped when seen from westward. About 5 and 6½ miles northward of this peak are two peaks, 6,713 and 6,122 feet ($2046^{m}2$ and $1866^{m}0$) high, respectively, which, from south-westward, appear as sharp cones.

Manggeng, 551 feet ($167^{m}9$) high, and of a lighter colour than its surroundings, lies 3½ miles south-westward of Soea Niboeng. *See* view facing page 260.

Chart 2778.

Kotatiang, 312 feet ($95^{m}1$) high, and of a lighter colour than its surroundings, lies 2 miles south-south-eastward of Manggeng, and 1¼ miles from the coast. Meuké (Möke) is a ridge with three peaks, the middle of which is 4,101 feet ($1250^{m}0$) high, and difficult to identify, lying 3¼ miles eastward of Ujong Meuké (page 255).

Chart 3870, plan of Susoh road.

Reede Soesoh.—Lights.—Dangers.—Beacon.—Telok Soesoh, entered between Ujong Pulau Kajeë (Kayee), about 3 miles east-south-eastward of Ujong Aroen, and Ujong Seurangga (Sörangga), one mile farther, affords some protection during the South-west monsoon, being sheltered from north-westerly winds, which sometimes blow with considerable force, when a heavy swell sets into the anchorage.

Ujong Seurangga (*Lat. 3° 43′ N., Long. 96° 48′ E.*) is a low barren sand spit, near the inner end of which is Soesoh village and a grove of coconut palms. Near the eastern end of the village, with its zinc-roofed houses, is a noticeable tree which shows above the edge of the wood, and at the head of the bay there is a noticeable tree, painted white.

Both entrance points are fringed by a coral reef, that from the north-western point extending about a quarter of a mile south-eastward.

A pier is situated about one cable northward of the western entrance point.

Two leading lights are occasionally exhibited from the head of the bay; the front light from a beacon, surmounted by a white triangle, point up, the rear light from a beacon, surmounted by a white triangle, point down.

A light is occasionally exhibited from the head of the pier.

A shoal, with a least depth of 1½ fathoms ($2^{m}7$), lies three-quarters of a mile south-westward of Ujong Pulau Kajeë. About 7 cables south-south-eastward of this shoal is a rock, with a depth of 4¼ fathoms ($7^{m}8$), and between these two dangers is a 2¾-fathom ($5^{m}0$) patch. A 2¾-fathom ($5^{m}0$) patch lies about 4 cables southward of Ujong Pulau Kajeë.

A shoal, over which there is a depth of 2¾ fathoms ($5^{m}0$), lies half a mile south-south-westward of Ujong Seurangga. A line of shoals, with depths of from 2¾ to 4¼ fathoms ($5^{m}0$ to $7^{m}8$), extends from 1¼ to nearly 2 miles southward from the same point.

Gosong Sangkalan, a bank of sand and coral, which dries, lies about 1½ miles south-eastward of Ujong Seurangga. Between this bank and the outer end of the line of shoals mentioned, there is a 3¾-fathom

Chart 3870, plan of Susoh road.

($6^{m}9$) patch, and southward of Gosong Sangkalan are other patches, with depths of from 2¾ to 4¾ fathoms ($5^{m}0$ to $8^{m}7$), the positions of which can best be seen on the chart.

In Telok Soesoh, about the middle of the bay, there is a shoal, with a depth of 7 feet ($2^{m}1$), marked by a beacon, surmounted by a ball, and 2 cables southward of it about on a line joining the entrance points, is a 4¾-fathom ($8^{m}7$) patch.

Caution.—The sunken dangers southward and westward of Soesoh do not show by discolouration owing to the turbid water from the rivers. They are steep-to, but the sea does not break over them and they are very small, and there may be other dangers not yet discovered in the vicinity, so that caution is necessary. The reefs westward of the meridian of Ujong Aroen all show either by discolouration or by the sea breaking over them.

Anchorages.—Directions.—Small vessels may obtain anchorage in Telok Soesoh westward of Soesoh village, in depths of from 6½ to 7½ fathoms ($11^{m}9$ to $13^{m}7$), and in a depth of 10 fathoms ($18^{m}3$), mud, with the front light-beacon bearing 033°, and the pier-head, 310°.

Large vessels should anchor in the road, which, although sheltered to some extent by off-lying reefs, lies open to the westerly swell and to winds between west and south.

Charts 3870, plan of Susoh road, 2777, 2778.

A vessel approaching from westward should keep on the parallel of 3° 40′ N., which leads between the 2½-fathom ($4^{m}6$) shoal southward of Ujong Aroen and a 3¾-fathom ($6^{m}9$) patch about 2½ miles farther southward; when the western houses of Soesoh bear 055°, she should steer for them on that bearing until the leading light-beacons at the head of the bay are in line, bearing 021°, when she should keep on this alignment, and proceed thence to the anchorage.

The sea seldom breaks over the 4¼-fathom ($7^{m}8$) rock, 1¼ miles southward of Ujong Pulau Kajeë, and the reefs near it; these dangers are steep-to, requiring considerable caution when entering, and there is no discolouration.

A vessel approaching from south-eastward should steer for a point just westward of the casuarina wood on Ujong Aroen (*Lat. 3° 45′ N., Long. 96° 45′ E.*), bearing 334°, until the western houses of Soesoh village bear 055°, when she should steer for them and proceed as directed above.

A small vessel with local knowledge approaching from south-eastward may keep close inshore and pass between Gosong Sangkalan and Ujong Padang Pandjang, northward of it, and thence between Ujong Seurangga and the 2¾-fathom ($5^{m}0$) patch southward of it. If approaching from westward she may keep close inshore, and when off Ujong Pulau Kajeë, she should close the coastal reef, passing between it and the 2¾-fathom ($5^{m}0$) patch about 4 cables southward of the point; this patch does not show and the passage is only about one cable wide.

Chart 2778.

Coast.—Dangers.—The coast between Soesoh and Labohan Hadji (Haji), 15 miles south-eastward, is low; the reefs lying in the vicinity of the 10-fathom ($18^{m}3$) line are occasionally marked by the swell, but never by discolouration.

Between Soesoh and Ujong Manggeng, 9 miles south-south-east-

Chart 2778.

ward, there are several reefs lying from three-quarters of a mile to one mile offshore, and from the latter point a reef extends about 1½ cables. Ujong Manggeng, although low, is easy to identify from south-eastward or north-westward by its high casuarina trees. A 2¾-fathom ($5^{m}0$) patch lies 1¾ miles west-south-westward of the point; a reef, with a depth of 1¾ fathoms ($3^{m}2$), lies about three-quarters of a mile southward of Kuala Pawoh Baro, situated 3¼ miles south-eastward of Ujong Manggeng.

Labohan Hadji is a small bay backed by rather high land. The village of the same name lies on its western side, and its high coconut palms are visible from a considerable distance. Vessels should approach the road with these palms bearing 011°.

Two shoals, with depths of 1¾ fathoms ($3^{m}2$) and 2¾ fathoms ($5^{m}0$), lie, respectively, three-quarters of a mile westward and 1¼ miles south-westward, of the north-western entrance point of Labohan Hadji. Several shoals, one of which is awash, lie about 1½ miles southward of the same point and about half a mile offshore.

About 3 miles south-south-eastward of Labohan Hadji village is Ujong Paloemat (Palumat), which is dominated by a green mountain, 1,473 feet ($449^{m}0$) high, on the southern slope of which is a conspicuous tree. A shoal, with a depth of 1¾ fathoms ($3^{m}2$), lies about 1¼ miles west-north-westward of the point. A 3¼-fathom ($5^{m}9$) patch and a 4¼-fathom ($7^{m}8$) patch lie, respectively, about 2½ miles westward and 3¾ miles west-south-westward of the same point. Between this point and Ujong Bateë Mirah, about 2 miles south-south-eastward, there are steep-to projecting points, thence to Ujong Meuké (Möke), about 1¾ miles farther, the coast is low.

A 4¾-fathom ($8^{m}7$) patch lies about one mile north-westward of Ujong Bateë Mirah and about half a mile offshore.

Reede Lho Meuké lies on the south-eastern side of Ujong Meuké, which is a small spit, on which there are some coconut palms, and is exposed to winds between south and west. The coastal reef in the vicinity is steep-to and the coast is low. Meuké village (*Lat. 3° 27′ N., Long. 97° 03′ E.*) stands on the northern side of the bay, just within Ujong Meuké. A reef extends nearly one cable from the point. For Meuké peak *see* page 253.

A 4¾-fathom ($8^{m}7$) patch, which is steep-to, lies about half a mile south-westward of Ujong Meuké; a 3¾-fathom ($6^{m}9$) patch lies about 2½ miles west-south-westward and a 2½-fathom ($4^{m}6$) patch about 2 miles south-south-westward of the same point.

Anchorage may be obtained by vessels with local knowledge in fine weather off Meuké village, but if they are remaining over night they should anchor farther out. Vessels from southward should approach the road with Ujong Meuké bearing 006°.

Ujong Bateë Tongga, about 1½ miles southward of Ujong Meuké, is steep and dark-coloured. About one and 2 miles southward of it, respectively, are Karo and Bateë Tongga, the former an overgrown rock, and the latter a bare black rock, both lying on the outer edge of the coastal reef. About half a mile southward of Ujong Bateë Tongga is a 2¾-fathom ($5^{m}0$) patch.

Ujong Meuligoj (Möligoi), 2½ miles south-south-eastward of Ujong Bateë Tongga, may be identified by the pointed hill of the same name, 348 feet ($106^{m}1$) high, which dominates it. The point terminates in

Charts 2760, 748b.

Chart 2778.

two dark-coloured pointed rocks, off which lie several other rocks. Close northward of the point is Aloeë Pakoe village. A 3¼-fathom (5^{m}9) patch lies about one mile westward of the point.

A hill, 535 feet (163^{m}1) high, at Sawang village, one mile south-eastward of Ujong Meuligoj, has a flat summit; this hill and that on Ujong Meuligoj are of a lighter colour than their surroundings. Sawang village may be identified by a conspicuous house with a zinc roof. Ujong Kareuëng (Karoëng) lies about 2 miles south-south-eastward of Ujong Meuligoj. Lho Pawoh, a somewhat isolated mountain, 2,326 feet (709^{m}0) high, lies 2¾ miles south-eastward of Ujong Kareuëng and 1¼ miles from the coast.

Bateë Berlajar, about 3½ miles southward of Ujong Kareuëng, is a high pointed rock lying on the drying reef just clear of the point of the same name, and by a regular cone-shaped hill, 148 feet (45^{m}1) high, with a conspicuous tree on its summit, dominating it. This point may be mistaken for one very similar to it lying 7 miles north-westward of it, just northward of Karo; both points have conspicuous white patches on them.

Loear (Luar) village, about 1½ miles south-eastward of Bateë Berlajar, may be identified by its corrugated iron roofs. About one mile southward of Loear is a hill on the coast, 358 feet (109^{m}1) high, which may be identified by its light green colour; close south-eastward of it is Krambel village.

Off-lying dangers.—Between Ujong Kareuëng and Ujong Bodang, a high and steep point, 6¾ miles south-south-eastward, there are several shoal patches, with depths of from 2¾ to 4¾ fathoms (5^{m}0 to 8^{m}7), lying within 1¾ miles of the coast. A 4¼-fathom (7^{m}8) patch lies about 4 miles westward of Ujong Koepiah, a high point situated about 2 miles south-south-eastward of Ujong Bodang.

Chart 3870, plan of Tapa Tuan road.

Tapa Toean and approaches.—Dangers.—Buoy.—Lights.—Reede Tapa Toean (Tuan), entered between Ujong Koepiah (Kupiah) and Ujong Batu Itam, 1½ miles eastward, is entirely open southward.

Ujong Boetoen (Butun) (*Lat. 3° 16′ N., Long. 97° 10′ E.*), about 8 cables south-eastward of Ujong Bodang, is low and has a noticeable tree on it.

A shoal, with a depth of 3¾ fathoms (6^{m}9), lies about 1¼ miles westward of Ujong Bodang. A 6-fathom (11^{m}0) patch and a 6½-fathom (11^{m}9) patch lie, respectively, 9 cables south-south-westward and one mile southward of Ujong Bodang. A 3¾-fathom (6^{m}9) patch lies about 1½ miles westward of Ujong Koepiah, and Batu Toengkat (Tungkat), which dries, lies 9 cables westward of the same point; a 1¼-fathom (2^{m}3) patch lies about one cable southward of this rock. Between Batu Toengkat and the coast north-eastward there is a channel with depths of less than 5 fathoms (9^{m}1) navigable only in calm weather. Batu Koepiah (Kupiah), which occasionally dries, lies one cable south-south-westward of Ujong Koepiah.

The shore of the roadstead is high and steep, and consists of wooded rocks and high hills; it is fringed by a reef in most places, but abreast Tapa Toean village, on the western side of the bay, there is a narrow channel through it, with a pier on its southern side. Lho Bingkoeang (Bingkuang) village is situated near the head of the bay, and there is a flagstaff on Ujong Reuban (Röban), about 6 cables north-eastward of Ujong Koepiah.

Charts 2760, 748b.

Chart 3870, plan of Tapa Tuan road.

The flat summit of Toean (Tuan) (chart 2778), 4,603 feet (1403^{m}0) high, situated about 3¼ miles north-eastward of Ujong Koepiah, is generally enveloped in mist. (*See* view facing page 260.) The more lofty peaks, lying well inland north-eastward and south-eastward of Tapa Toean, are visible only during clear weather in the early morning.

A light is exhibited, at an elevation of 182 feet (55^{m}5), from a white iron framework structure, 45 feet (13^{m}7) in height, on Ujong Koepiah.

A light is exhibited, at an elevation of 47 feet (14^{m}3), from a wooden post on the pier-head at Tapa Toean.

The limits of the roadstead are the meridian of longitude through the light-structure on Ujong Koepiah, the parallel of lat. 3° 14′ 30″ N. and an imaginary line drawn in a 225° direction from Ujong Bateë Merah, situated half a mile north-westward of Ujong Batu Itam.

Gusong Gila, with a least depth of 2 fathoms (3^{m}7), and steep-to, lies half a mile westward of Ujong Batu Itam ; the sea usually breaks over this danger. The channel between it and Ujong Bateë Merah is deep.

Gusong Pakah, over which there is a depth of 1¼ fathoms (2^{m}3), with a depth of 3¾ fathoms (6^{m}9) between it and the coastal reef westward of it, lies close south-eastward of Tapa Toean village ; it is marked on its south-eastern side by a black can buoy, and the sea usually breaks on it.

Anchorage.—Good anchorage may be obtained, in a depth of 20 fathoms (36^{m}6), mud, with the pier-head bearing 324°, and Ujong Koepiah, 270°, but the anchorage is uncomfortable with winds between west and south.

Prohibited anchorage.—Vessels are forbidden to anchor within the area enclosed by (a) a line drawn 196° from the cable notice-board standing at the head of the bay ; (b) a line drawn 240° from Ujong Batu Itam ; (c) the coastline between Ujong Batu Itam and the cable notice-board.

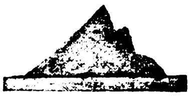
Tapa Toean.—Tapa Toean is the headquarters of an Administrator. The houses stand along the western shore of the bay, most of them having zinc roofs. The Administrator's house is very prominent. There is a resident medical officer. Fresh water may be obtained.

There is regular communication by steamer with other ports in Sumatra.

Chart 2778.

Caution.—From a position about 7½ miles westward of Ujong Koepiah to 12½ miles south-westward of Ujong Poelo (Pulo) (page 258), a distance of about 33 miles, there are shoals, with depths of from 3 to 6½ fathoms (5^{m}5 to 11^{m}9), lying outside and just inside the 100-fathom (182^{m}9) line, extending from 6½ to 12 miles offshore. Between these shoals and the coast there are many other dangers with even less depths, the positions of which can best be seen on the chart.

Coast.—Ujong Nasi Satoengkoes (Satungkus) (*Lat. 3° 14′ N., Long. 97° 13′ E.*), about 3 miles east-south-eastward of Ujong Koepiah, is high and prominent ; on its eastern side is Lho Roekam (Rukam). Teureubangan Tjoet, 295 feet (89^{m}9) high, and of a light green colour, is a prominent hill on the coast, about 3¼ miles south-eastward of Ujong Nasi Satoengkoes. About one mile northward of it is a noticeable light green patch, on a hill, at an elevation of 764 feet (232^{m}9). About



Teureubangan Tjoet, bearing 064°.
(*Original dated* 1902.)

Charts 2760, 748b.

Chart 2778.

3¾ miles north-eastward of Teureubangan Tjoet is a conical-shaped mountain, 3,583 feet ($1092^{m}1$) high. About 11 miles south-south-eastward of Ujong Nasi Satoengkoes is Kuala Baro, the northern mouth of Krueng Kloeët (Kluet), and between them are the villages of Seuneubo (Sönöbo), Rasian, and Asahan. About midway between Seuneubo and Rasian there is a remarkable high tree, visible from a considerable distance.

Keude Atjeh village stands on the southern side of Kuala Baro. Krueng Kloeët discharges through two mouths, in which the sea usually breaks, so that neither can be entered. Kuala Toeha (Tuha), the southern mouth, lies 2¾ miles southward of Kuala Baro. About 2½ miles farther south-eastward is Kuala Leumbang (Lömbang). Ujong Kareuëng (Karöeng) is a low densely wooded point, 5½ miles south-eastward of Kuala Toeha.

Aspect.—The principal hills and mountains visible from off this part of the coast are :—Between the south-eastern end of a ridge extending about 8 miles from Toean (page 257) and the northern end of a ridge which curves southward towards Kuala Baro, is a deep cleft. The most conspicuous summits on this latter ridge are one, 1,371 feet ($417^{m}9$) high, situated 3¼ miles eastward of Rasian village ; Tjoet, 633 feet ($192^{m}9$) high, about one mile south-south-westward of this summit, and Pinjië, 472 feet ($143^{m}9$) high, about three-quarters of a mile farther in the same direction.

About 2 miles eastward of Kuala Baro is Kalang Baloeh, 390 feet ($118^{m}9$) high, noticeable for its isolated position. About 4½ miles farther eastward is Leumbang (Lömbang), 1,795 feet ($547^{m}1$) high, noticeable from all directions, as it rises from the wide plain of the Kreung Kloeët.

For the mountains farther south-eastward, *see* page 259.

Coast.—Bakongan baai is a slight indentation in the coast between Ujong Kareuëng and Ujong Poelo (*Lat. 2° 53′ N., Long. 97° 31′ E.*), 6½ miles east-south-eastward. It affords good anchorage to vessels with local knowledge, in depths of about 15 fathoms ($27^{m}4$), mud, off Bakongan village, situated 3¾ miles eastward of Ujong Kareuëng, about half a mile offshore, sheltered from north-westerly winds. The village may be identified by several houses with corrugated iron roofs. The best approach to the anchorage is close inshore inside Mangki.

Off-lying islets and dangers.—Mangki, a bright white sandbank, which sometimes covers, lies about 1¾ miles south-south-eastward of Ujong Kareuëng and about one mile offshore, with a least depth of 6 fathoms ($11^{m}0$) between ; it is fringed by a coral reef.

Anoë (Anu), a dark-coloured sand cay, surrounded by a coral reef, marked by breakers, lies about 7 cables south-eastward of Mangki. Djoteudoeh, a reef with a depth of 1¼ fathoms ($2^{m}3$), lies one mile south-westward of Bakongan village, and Kapal, a reef, with a depth of 5 feet ($1^{m}5$), lies about 3 cables southward of Djoteudoeh. These are the only reefs in the bay, which are sometimes marked by breakers. Sigöntut, with a depth of 2¾ fathoms ($5^{m}0$), lies about 1¾ miles southward of the village.

Toeangkoe and Kajeë (Kayee), low sand islets, fringed by reef and covered with coconut palms, lie about 4 cables south-westward, and 5 cables south-south-westward, respectively, of Ujong Poelo. Ampong Ara, a bare sandy cay, lies about 7 cables south-south-westward of

Charts 2760, 748b.

Chart 2778.

Kajeë, with a depth of 2 fathoms (3^{m}7) between. Gila, a reef, awash, lies half a mile eastward of Ampong Ara. Pandjang, over which there is a depth of 5 feet (1^{m}5), lies half a mile westward of Toeangkoe.

Datoe (Datu), a reef with a depth of 2½ fathoms (4^{m}6), lies about 3¾ miles south-westward of Ujong Poelo. A 3¼-fathom (5^{m}9) patch lies about three-quarters of a mile southward of Datoe.

Coast.—Dangers.—Lho Sibadeh is a bight lying between two low points, Ujong Doesalam, covered with high casuarina trees, situated about 1¼ miles south-eastward of Ujong Poelo, and Ujong Laboh Tangko, 1½ miles eastward of Ujong Doesalam. Fair shelter with good holding ground may be obtained by vessels with local knowledge in this bight, and also in Lho Laboh Tangko, close eastward of Ujong Laboh Tangko. Sileukat village is situated at the head of Lho Laboh Tangko.

Tape, a reef, with a depth of 1½ fathoms (2^{m}7), lies about one mile south-south-eastward of Ujong Laboh Tangko. Ië Nipah, with a depth of 3 feet (0^{m}9) at its southern end, lies about 3¼ miles southward of the same point and about 1½ miles offshore.

Aspect.—The most conspicuous hills and mountains visible from off this part of the coast are :—Poentjië (Punchie), 1,529 feet (466^{m}0) high, lying about 6½ miles northward of Ujong Poelo, Bateë Poetih (Putih), 2,182 feet (665^{m}1) high, with a sharp point, 3 miles south-eastward of Poentjië, and Pintorimba, 2,329 feet (709^{m}9) high, nearly 2 miles north-north-eastward of Ujong Laboh Tangko. Close to the coast, three-quarters of a mile south-eastward of Sileukat village, is Tjoele Batu, 879 feet (267^{m}9) high.

Sileukat, 1,594 feet (485^{m}9) high, and conical, lies 1¼ miles north-eastward of Sileukat village, and about 7¾ miles farther in the same direction is a dome-shaped summit, 3,665 feet (1117^{m}1) high.

Teungkoe (Tongku), 1,480 feet (451^{m}1) high, with a rounded summit, lies about 13½ miles eastward of Sileukat village.

Batak, 5,266 feet (1605^{m}1) high, lies 27½ miles east-north-eastward of Sileukat village; it has the shape of a sugar loaf, and is seldom visible.

Coast.—Dangers.—Troemon (Trumon) village, which stands on the river of the same name, about 4¾ miles southward of Sileukat village, is not visible from seaward when bearing less than 090°, except through a clearing in the forest, through which also the mountainous country eastward of Ujong Poelo can be seen sloping towards the Troemon plain. An isolated casuarina tree stands about a quarter of a mile northward of the village (*Lat. 2° 49′ N., Long. 97° 37′ E.*).

Troemon (Trumon), a low sand cay, with a few high coconut palms on it, lies on the north-eastern side of a reef extending in a north-north-westerly and south-south-easterly direction, 1¾ miles south-westward of Troemon village. Seuneubo, a reef with a depth of 3 feet (0^{m}9), and Meudang (Mödang) Ara, a reef which dries, lie about 1½ miles southward and 2½ miles south-south-westward, respectively, of Troemon cay. Between Troemon cay and Meudang Ara there are several shoals, with depths of from 3¼ to 4¾ fathoms (5^{m}9 to 8^{m}7), the positions of which may best be seen on the chart. A 1¾-fathom (3^{m}2) patch lies about 3½ cables southward of Meudang Ara.

Anchorage may be obtained by vessels with local knowledge, in a depth of 6 fathoms (11^{m}0), eastward of Troemon cay, but the road is unsafe with north-westerly and south-westerly winds.

Charts 2760, 748b.

Chart 2778.

Coast.—Between Troemon village and Singkel, about 34 miles southward, is a wide alluvial plain, thickly wooded with casuarina trees, except just northward of Kuala Boeloehseuma (Buluhsöma), about 17 miles southward of Troemon, where there are a few isolated casuarinas. This wide plain continues southward as far as the vicinity of Baroes (Barus), about 40 miles east-south-eastward of Singkel.

Chart 3850.

Ujong Pasir Gala, about 9 miles southward of Kuala Boeloehseuma, and the low coast south-eastward of it is uniformly wooded with casuarinas, the only feature being Baroe (Baru) village, situated about midway between Ujong Pasir Gala and Singkel.

Chart 2778.

Off-lying dangers.—Sigeudoee (Sigödue) or Ajer Hitam, a reef, with a depth of 3 feet (0^{m}9), lies 5 miles south-south-eastward of Meudang Ara and 1¾ miles offshore. Heria, a reef, with a depth of 1¾ fathoms (3^{m}2), lies 4½ miles south-south-westward of Sigeudoee, and nearly 5 miles offshore. Laot, a reef, with a depth of 2½ fathoms (4^{m}6), lies about 4¼ miles south-south-eastward of Heria and about 3 miles offshore.

Chart 3850.

Amboina, a reef, with a depth of 1¼ fathoms (2^{m}3), lies 5½ miles southward of Laot, and 3 miles offshore.

None of these dangers is marked by surf or discolouration. For dangers southward of them and for the passage inside them, *see* page 278.

Chart 2778.

SIMEULOE.—Simeuloe or Simaloer (Simalur), the northernmost of the large islands off the west coast of Sumatra, lies with Ujong Matankeli, its south-eastern extremity, 70 miles westward of Ujong Pasir Gala. Sibaoe (Sibau), 2,051 feet (625^{m}1) high, the highest peak of the island, lies on the north-eastern side about 18 miles north-westward of Ujong Matankeli; Sanoelok (Sanulok), the highest peak at the north-western end, is 1,476 feet (449^{m}9) high, and may be identified by a small clump of trees rising above the others. *See* view facing this page. Sinabang, the principal harbour, lies on the north-eastern side of the island, at the south-eastern end. The island is everywhere wooded, as are most of the islands off-lying it.

Earthquakes and tidal waves occasionally occur, but minor shocks are frequent. In 1907, the south coast was partially submerged due to an earthquake.

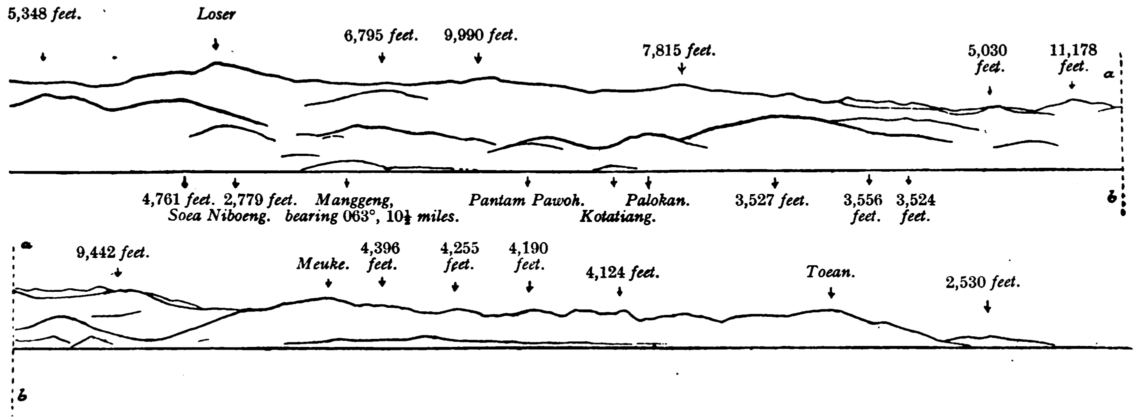
The coasts are mostly rocky, and there are many off-lying islands, islets, and reefs, and most of the islets have coconut palms on them. The reefs close-to, and those between the several coral islets are steep-to, and, except those near Sioemat (Siumat) (*Lat.* 2° 39′ *N.*, *Long.* 96° 23′ *E.*), on the north-eastern side of the island, show up distinctly. The depths round the island vary greatly, so that sounding gives little warning of the approach of land; a good look-out from aloft is advisable.

Several rivulets discharge into the bays, but on account of the difficulty in entering them, few will admit even boats. There are a few roads, but nearly all the transport is done by praus.

From May to December the coasts of Simeuloe, especially the south,

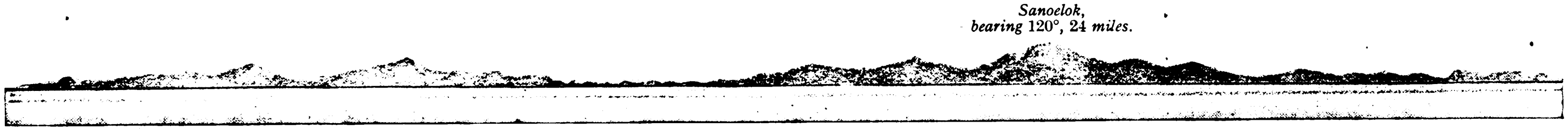
Charts 2760, 748b.

To face page 260.



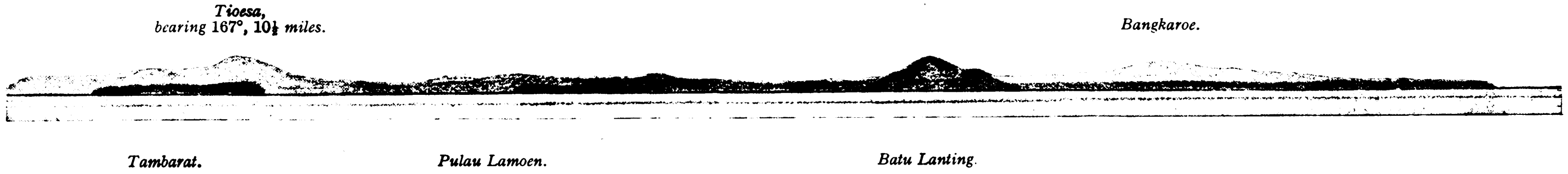
View, in two parts, of coast between Ujong Manggeng and Tapa Toean.

(*Original dated* 1921.)


Sanoelok, bearing 120°, 24 miles.

Simeuloe, north-west coast.

(*Original dated* 1902.)


Tioesa, bearing 167°, 10½ miles.
Bangkaroe.
Tambarat.
Pulau Lamoen.
Batu Lanting.

Banjak eilanden.

(*Original dated* 1902.)

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Chart 2778.

west, and east coasts, are mostly inaccessible; almost everywhere the surf runs high, and the reefs, even those with depths of not less than 5 fathoms ($9^{m}1$) can always be distinguished by breakers. The natives consider December the worst month in the year; in that month high seas may occur on the whole coast.

At other times of the year there is frequently considerable surf on the coast, and the swell is always troublesome.

Inhabitants.—The island is thinly populated. The inhabitants are largely composed of Niassers, Achinese, and Malays, nearly all Muhammadans, who mostly live near the coast or on the islets. Sioemat is the only island with a settled population. The original inhabitants, who live on the south and south-west coasts, are divided into different tribes, each one of which has its own language, but Malay as spoken in the Padang highlands, is generally understood.

Tidal streams.—During the stay of the surveying vessel *Benkoelen* a south-easterly set was observed on the north-east coast, from about one hour after the rising and setting of the moon up to the time of the moon's meridian passage; during the remainder of the time, the stream set north-westward at a rate of a half to one knot.

Kokos eilanden.—Dangers.—Kokos or Salaoet (Sa Laut) eilanden, consisting of Salaoet besar and Salaoet kechil, lie about 24 miles westward of Ujong Liwa, the northern extremity of Simeuloe, and are connected with the north-western end of that island by a bank, on which there are patches, with depths of from 5 to 7 fathoms ($9^{m}1$ to $12^{m}8$). These patches are usually marked by heavy rollers, but do not show by discolouration. Both islands are low and are overgrown with coconut palms. Salaoet besar, the southern island, is inhabited.

Breakers have been reported to extend one mile southward from Salaoet besar.

A 5-fathom ($9^{m}1$) patch lies 3¼ miles south-eastward of the southern extremity of Salaoet besar, and another of the same depth lies about 2¾ miles east-north-eastward of the eastern extremity. Patches, with depths of 4 and 5 fathoms ($7^{m}3$ and $9^{m}1$), extend about 2 miles south-eastward from Salaoet kechil, and there are depths of less than 3 fathoms ($5^{m}5$) extending three-quarters of a mile south-eastward, and about 2¾ cables eastward from the same island.

Anchorage.—Anchorage may be obtained, in a depth of about 8 fathoms ($14^{m}6$), with the northern extremity of Salaoet besar bearing 272°, distant 2 miles.

NORTH-EASTERN SIDE OF SIMEULOE.—Coast.—Dangers.—The headlands on the north-east coast are low and difficult to distinguish. Ujong Liwa (*Lat. 2° 56′ N., Long. 95° 48′ E.*), however, is high and wooded, and easily identified from the eastward, but from westward or north-westward it is difficult to distinguish until bearing more than 225°.

Northward and north-westward of Ujong Liwa there are several patches, with depths of 5 and 5½ fathoms ($9^{m}1$ and $10^{m}1$), lying about 2 miles offshore, the positions of which can best be seen on the chart. For the dangers westward of the point, *see* page 269.

A 2½-fathom ($4^{m}6$) patch, with a 4-fathom ($7^{m}3$) patch close eastward of it, lies about 1½ miles east-north-eastward of Ujong Liwa.

Van Rossum reef, over which there is a depth of 1½ fathoms ($2^{m}7$),

Charts 2760, 748b.

Chart 2778.

lies about 2½ miles eastward of Ujong Liwa; it shows by discolouration and the sea sometimes breaks on it. About half a mile south-eastward of the reef is a 2½-fathom ($4^{m}6$) patch, and about three-quarters of a mile southward is a 2¾-fathom ($5^{m}0$) patch.

A bay encumbered with reefs is entered between Ujong Liwa and Ujong Sibobeh, a low wooded point about 2¼ miles east-south-eastward. Ijabatti, a sandbank, which dries, lies about one mile north-westward of Ujong Sibobeh, and a 3-fathom ($5^{m}5$) patch lies about the same distance north-eastward of the point.

Midway between Ujong Sibobeh and Ujong Sanggiran, a low and wooded point, 2½ miles eastward, a reef extends about a quarter of a mile offshore. Close westward of Ujong Sanggiran is a large village, and 2 miles south-eastward is Ujong Sibaloeng (Sibalung), a rugged and slightly raised point.

Chart 3871, plan of Lugu Sibigo.

Ujong Sibigo lies about 2 miles south-south-eastward of Ujong Sibaloeng. A reef, with depths of from 4 to 18 feet ($1^{m}2$ to $5^{m}5$), extends 2¼ cables east-south-eastward from the point, and a 2-fathom ($3^{m}7$) patch lies about three-quarters of a cable north-eastward of its outer end. Bukit Sibigo, 1,175 feet ($358^{m}1$) high, lies about 1¼ miles west-north-westward of Ujong Sibigo, and is the highest summit in the vicinity.

Loegoe Sibigo and approaches.—Dangers.—Loegoe (Lugu) Sibigo is entered about 1¼ miles southward of Ujong Sibigo; the entrance is 2¼ cables wide and deep in the fairway, but a spit, with a depth of 1½ fathoms ($2^{m}7$), extends about three-quarters of a cable northward from the southern entrance point.

Sefacha hill, 722 feet ($220^{m}1$) high, lies about one mile southward of the southern entrance point, and is a good mark for indicating the entrance, which, otherwise, is difficult to distinguish from the offing.

Kitjik (Kichik) and Penjoe (Penyu), two islets connected by a shallow ridge, lie south-eastward of Ujong Sibigo, leaving between the reef extending from that point and the reef extending westward from the former islet, a deep channel, about 1¼ cables wide between the 10-fathom ($18^{m}3$) lines on either side. A shoal, with depths of less than 3 fathoms ($5^{m}5$), extends about 1¼ cables south-south-eastward from Penjoe.

Tinggi (*Lat. 2° 50′ N., Long. 95° 58′ E.*), an islet, fringed by a reef, except on its south-western side, lies about 1¼ miles east-south-eastward of Penjoe. Gala Gala, 8 cables southward of Tinggi, is generally steep-to, but is fringed by a narrow reef at its north-western end. Between these two islets and between Gala Gala and Simeuloe, there are coral reefs, with depths of from one to 3 fathoms ($1^{m}8$ to $5^{m}5$).

A one-fathom ($1^{m}8$) patch lies about 1¾ miles south-eastward of Gala Gala, and about one mile eastward of Ujong Sigoelei (Sigulei).

Karang, a sandbank, which dries, lies 6 cables west-north-westward of the north-western end of Gala Gala. Shoals, with depths of less than 3 fathoms ($5^{m}5$), lie within 4 cables north-westward and one cable north-eastward of Karang, and there is a patch, which dries, lying near the north-western end of this shoal ground. A shoal, with a depth of 4¼ fathoms ($7^{m}8$), lies three-quarters of a mile north-westward of Karang.

All these shoals show by discolouration.

Charts 2760, 748b.

Chart 3871, plan of Lugu Sibigo.

On the south-eastern side of Loegoe Sibigo, just inside the entrance and close inshore is Boenoen (Bunun), an islet with a bank, with depths of less than 3 fathoms ($5^{m}5$), extending about three-quarters of a cable from its north-western side.

A rock, with a depth of about one foot ($0^{m}3$), lies a quarter of a mile south-westward of Boenoen ; between it and Sibigo village (*see* below) there is foul ground.

Mitim, about three-quarters of a mile south-westward of Boenoen, is an islet connected with the southern shore of the inlet by a shallow ridge. Foul ground extends about 2½ cables northward from the islet, and a shoal with a depth of one foot ($0^{m}3$), lies about one cable farther northward ; a 5-fathom ($9^{m}1$) patch lies about 7 cables northward of the islet.

Perak, an islet, lies about 1½ miles westward of the northern entrance point ; a spit, with a depth of one fathom ($1^{m}8$) at its outer end, extends about 1½ cables westward from the islet, and a 1½-fathom ($2^{m}7$) patch lies 1½ cables farther westward.

Loegoe (Lugu) Mabahan lies at the western end of Loegoe Sibigo ; its shores are mostly fringed with reef, and a sunken rock lies about 2¼ cables south-eastward of its northern entrance point. Northward of Loegoe Mabahan is an inlet in which is Seroe Faifoel (Seru Faiful), an islet connected to the north-eastern shore by a reef. There are other shoals in this inlet which leave only a narrow channel leading to the head. The dangers cannot be distinguished on account of the muddy water.

Sibigo, the principal village, is situated on the south-eastern side of the inlet, about three-quarters of a mile southward of the southern entrance point. Three rivers discharge into the inlet : Sungei Mabahan, at the western end, Sungei Lauloh and Sungei Mitim, on the southern side.

Anchorages.—Directions.—Anchorage may be obtained, in depths of from 21 to 24 fathoms ($38^{m}4$ to $43^{m}9$), anywhere in the middle of Loegoe Sibigo, or in a depth of about 13 fathoms ($23^{m}8$) westward of Sibigo village and southward of the two reefs southward of Boenoen. Unofficial beacons mark these two reefs, as well as those extending from the southern entrance point and from the north-western end of Boenoen. The latter anchorage is difficult to approach without the aid of the beacons.

Vessels approaching Loegoe Sibigo should pass between Penjoe and Tinggi (*Lat. 2° 50′ N., Long. 95° 58′ E.*), and close the northern side when passing through the entrance.

Coast.—Dangers.—About 2 miles south-eastward of the southern entrance point of Loegoe Sibigo, a reef, on which are several rocks which dry, extends about a quarter of a mile offshore, and about 2¼ miles farther in the same direction, Sungei Sigoelei (Sigulei) discharges at the low and sandy point of the same name. It is navigable by small craft. A sandbank extends about 1½ cables north-eastward from the point, and a bank, with depths of less than 3 fathoms ($5^{m}5$), extends about 3¼ cables northward. A shoal, with a depth of 5 feet ($1^{m}5$), lies about one mile eastward of the entrance to the river.

Chart 2778.

Ujong Sembilan, on which there is a village of the same name, lies 2 miles south-eastward of Ujong Sigoelei. Asoe (Asu), a low, wooded

Charts 2760, 748b.

Chart 2778.

islet, fringed by a narrow reef, lies about a quarter of a mile eastward of Ujong Sembilan, with a channel clear of dangers between.

Siboesoek, 689 feet (210^m0) high, and Labauja, 948 feet (288^m9) high, are two hills with a noticeable deep gap between them, lying about 1½ miles westward and south-south-westward, respectively, of Ujong Sigoelei.

Lajabahoeng (Layabahung) rivier discharges about 3 miles south-eastward of Ujong Sembilan ; it is navigable for 7 miles by small craft drawing not more than 2 feet (0^m6). For about 1¾ miles on either side of the mouth a reef, with depths of less than 3 fathoms (5^m5), extends about half a mile offshore.

A reef, with a depth of 3 feet (0^m9), lies about 1¼ miles north-eastward of the mouth of Lajabahoeng rivier, and about three-quarters of a mile offshore.

Chart 3872, plan of Telok Dalam and Lugu Sibabu.

Coast.—Ujong Siango, 5 miles east-south-eastward of the mouth of Lajabahoeng rivier, is fringed by a reef which extends about half a cable offshore ; a reef, with a depth of 4 feet (1^m2), lies about 3 cables south-south-eastward of the point, and another, with the same depth, about 6 cables south-eastward.

Loegoe Sibaboe.—Dangers.—Loegoe Sibaboe (Lugu Sibabu) is entered between the southern extremity of Faloe (Falu), an island lying close offshore, with its northern extremity about one mile southward of Ujong Siango, and Ujong Silingar, about 2¾ cables south-eastward. A low sandy spit, with some coconut palms on it, extends about 1¼ cables southward from the southern extremity of Faloe, and a reef, on which there are some rocks above water and some which dry, extends about 2 cables northward and about three-quarters of a cable north-westward from Ujong Silingar, leaving a deep channel, about one cable wide in the entrance to the inlet ; these reefs are usually marked by discolouration.

A 2¼-fathom (4^m1) patch lies in the middle of Loegoe Sibaboe ; about 6¼ cables west-south-westward of the southern extremity of Faloe, and about 2 cables south-westward of the patch is a rock which dries.

Anchorage.—Directions.—Anchorage may be obtained anywhere in the bay clear of the dangers mentioned above, in depths of from 10 to 22 fathoms (18^m3 to 40^m2).

A vessel should approach the entrance from northward, steering about 205°, and keep nearer the southern side in the entrance ; when the reef extending southward of Faloe is abeam, she should steer 305°, and thence pass the inner points on a westerly course. The entrance is difficult to identify.

Telok Dalam.—Dangers.—Telok Dalam, entered between Ujong Sibin (*Lat. 2° 41′ N., Long. 96° 09′ E.*), about 1¾ miles southward of Ujong Silingar, and Ujong Sirih, 7 cables south-south-eastward, is easily identified, by the summit of Langeni, an island, 427 feet (130^m1) high, which is seen over the low southern entrance point, and also by Lampau, an island of moderate elevation, covered with coconut palms, in the middle of the entrance. Baloeng (Balung), an islet, lies about 7 cables west-south-westward of Lampau. There are several other islands in the bay, but they lie mostly close inshore.

The coastline is everywhere low, marshy, and fairly steep-to, and is indented by a number of small inlets.

Charts 2760, 748b.

Chart 3872, plan of Telok Dalam and Lugu Sibabu.

A bank, with depths of from one to 4 fathoms ($1^{m}8$ to $7^{m}3$), extends nearly one mile north-eastward from Ujong Sirih.

A 4½-fathom ($8^{m}2$) patch lies 1¾ cables south-eastward of Ujong Silingar, and another patch with the same depth, lies about 2½ cables north-eastward of the western extremity of Langeni. A rock, which dries, lies at the south-western end of a shoal about 7 cables south-westward of Baloeng.

Hala Hala, an islet, lies on a bank, with several rocks above water, extending 3¾ cables from the western side of the bay westward of Baloeng; about 3¾ cables southward of Hala Hala is a rock with a depth of 4 feet ($1^{m}2$).

A shoal, on which there are two rocks which dry, lies 1¼ miles south-eastward of the southern extremity of Langeni, and a rock, with a depth of 4 feet ($1^{m}2$), lies 3¾ cables north-westward of the shoal.

Anchorage.—Directions.—Good anchorage may be obtained anywhere in the bay clear of the dangers mentioned above, but smoother water may be obtained in Sinabang baai (page **266**).

The passage southward of Lampau should be used in preference to that northward of it, and a berth of about 1½ cables should be given to the south-eastern point of that island.

Charts 3872, plan of Telok Dalam and Lugu Sibabu, 2778.

Coast.—Between the point situated three-quarters of a mile east-south-eastward of Ujong Sirih, and a point about 5 miles farther south-eastward, a bank, with irregular depths, on which are many rocks above water, some with vegetation on them, extends about 1¾ miles offshore. About 3½ miles south-eastward of Ujong Sirih is Pinang, an island joined to the main island by a sunken ledge on which are two islets. A reef with an islet on its outer end extends about 1½ cables from the eastern end of Pinang. The island is difficult to identify.

Chart 2778.

The coastal reef then recedes, forming a bight, on the eastern side of which it again extends in the form of a spit, on which are numerous rocks above and below water as far as Sioemat, an island lying 6 miles offshore.

Cornelis rocks, above water, lie one mile eastward of Pinang, and a 2½-fathom ($4^{m}6$) patch lies one mile north-eastward of the same island.

South-eastward of Loegoe Boni, the southern arm of Telok Dalam, a range of hills extends parallel with the coast, as far south-eastward as Ujong Koeala Oema, about 12 miles south-eastward of Ujong Sirih. Sibaoe, the highest peak of the island, lies near the south-eastern end of this range. *See* page 260.

Ujong Ganting (*Lat. 2° 33′ N., Long. 96° 21′ E.*), from which a reef with an islet on it extends 2 cables north-eastward, lies 1½ miles east-south-eastward of Ujong Koeala Oema.

Off-lying island and dangers.—Dog riffen, with a least depth of one fathom ($1^{m}8$), and marked by discolouration, lie about 4 miles north-westward of Sioemat, with a clear passage between them and the reef extending from that island.

Sioemat, 361 feet ($110^{m}0$) high and wooded, is fringed by a reef, which, on the northern side, has some rocks above water on it, lying near the edge about three-quarters of a mile from the island.

Limau and Talam are two islets lying on the north-western side of the foul ground about 2 and 3½ miles, respectively, south-westward

Charts 2760, 748b.

Chart 2778.

of the western extremity of Sioemat; between the southern side of the island and the entrance to Sinabang baai there are the islets of Mantahari, Kasi and Toepa (Tupa), and numerous rocks above and below water, with deep channels between them. Vessels should not attempt to pass between Sioemat and the coast of Simeuloe.

Chart 3849, plan of Sinabang bay and Telok Lingi.

Telok Linggi and approaches.—Dangers.—Telok Linggi (Lingi), entered between Benar, an island situated one mile south-eastward of Ujong Ganting, and Pandjang besar, 8½ cables farther in the same direction, affords anchorage to the largest vessels.

Bilalang, an island fringed by reef, lies about 8 cables eastward of Ujong Ganting, and between there are several rocks which dry; from its eastern end a spit, with a depth of 4 fathoms ($7^{m}3$) over its outer end, extends about a quarter of a mile eastward.

Benar, on which there are some high trees and some coconut palms, lies one cable from the main island, with a depth of 4 fathoms ($7^{m}3$) between. A reef extends about one cable north-eastward from its north-eastern extremity.

Soembawa (Sumbawa) riffen, consisting of many shoal patches, on which there are rocks above water, with deep channels between them, lie in the north-eastern approach to Telok Linggi. Awah, an islet fringed by reef, lies one mile east-north-eastward of Benar, with a clear channel between, and 7 cables farther in the same direction is Djawi Djawi (Jawi Jawi), another islet fringed by reef, with a rock, which dries, lying between them.

Two islets, joined by a reef, lie about 7 cables southward of Djawi Djawi. Between the southern of these islets and the northern side of Pandjang besar there is a deep channel about half a mile wide. Lampaseh, an islet fringed by reef, lies half a mile east-south-eastward of Benar with irregular depths between. A 3½-fathom ($6^{m}4$) patch lies about 1¾ cables north-eastward of the islet. Pandjang besar, 463 feet ($141^{m}1$) high at its north-western end, is separated from the main island by a narrow passage in the middle of which there is a 2¼-fathom ($4^{m}1$) shoal. Balah, a rock above water, lies on the eastern end of a reef which is nearly connected to a point on the western side of the bay, 4 cables south-westward of Benar. Sarok and Si Lajar (Layar) are two islets in the approach to the southern inlet of the bay, on the southern shore of which is Linggi village.

Anchorages.—The usual anchorage is between Benar and Lampaseh or off Pandjang besar (*Lat. 2° 31′ N., Long. 96° 22′ E.*).

Sinabang baai and approaches.—Lights.—Dangers.—Beacons.—Sinabang baai is entered between the eastern extremity of Pandjang besar and Ujong Babang, 6½ cables eastward, but the navigable channel between the reefs extending from either side is about 4½ cables, which is reduced to about 2¾ cables farther southward.

Babi, an islet, 80 feet ($24^{m}4$) high, and fringed by a reef, lies 1¼ miles northward of Ujong Babang. Rangasa, an islet lying on the southern end of a reef which dries, lies 2¾ cables south-south-westward of the western extremity of Babi. Between these two islets and Soembawa riffen there are several sunken rocks, and some rocks above water lie on the western end of a shoal, about 2 cables south-eastward of Rangasa. The southern extremity of this shoal is marked by a white beacon surmounted by a ball.

Charts 2760, 748b.

Chart 3849, plan of Sinabang bay and Telok Lingi.

A reef, on the outer end of which are some rocks above water, extends about one mile north-eastward from Ujong Babang. A black beacon, surmounted by a truncated cone, stands about one cable north-westward of the rocks.

Three reefs, the middle one of which dries, lie northward of the eastern end of Pandjang besar and about three-quarters of a mile north-westward of Ujong Babang (*Lat. 2° 31′ N., Long. 96° 24′ E.*).

A chain of islets extends eastward from the western side of the bay, and in the bight on the eastern side is Simandah, an islet, with another lying on the same reef close north-westward of it.

A light is exhibited, at an elevation of 217 feet ($66^{m}1$), from a white iron framework structure, 39 feet ($11^{m}9$) in height, on a hill, about 2½ cables southward of Ujong Babang.

A light is occasionally exhibited, at an elevation of 16 feet ($4^{m}9$), from a white iron framework structure, on the reef extending westward from Ujong Babang.

Two lights, vertically disposed, are occasionally exhibited, at an elevation of 16 feet ($4^{m}9$), from a white iron framework structure, on the south-eastern extremity of Pandjang kechil, situated 8 cables south-westward of Ujong Babang.

A light is exhibited, at an elevation of 13 feet ($4^{m}0$), from a white iron framework structure, on Tanjong Labana, about 1¼ miles south-south-westward of Ujong Babang.

In the southern part of Sinabang baai are the two islets of Pandan and Kechil, lying 6½ and 9 cables, respectively, south-south-westward of Tanjong Labana. A shoal, the southern end of which dries, lies between these two islets. A 2¾-fathom ($5^{m}0$) patch lies one cable south-eastward of Pandan, and a 2-fathom ($3^{m}7$) patch lies about 3 cables southward of Tanjong Labana, and one cable from the eastern shore.

A shoal, which dries in places, extends 3½ cables northward from Ujong Ama Paloe (Palu), situated about 1¼ miles southward of Tanjong Labana, and is marked at its northern end by a black beacon surmounted by a truncated cone.

The limits of the roadstead are, on the northern side, imaginary lines joining the eastern side of Tanjong Labana and the south-eastern extremity of Boengkoe (Bungku), the islet 1¾ cables west-south-westward of Pandjang kechil and thence to the point on the western side of the bay 1¼ miles westward of Tanjong Labana; and on the southern side, the parallel of latitude through Ujong Ama Paloe.

Submarine cable.—A submarine cable, the track of which is indicated on the chart, is landed near Sinabang.

Anchorage.—Directions.—Sinabang baai is accessible to the largest vessels. The area southward of Pandjang kechil and the islands westward of it affords anchorage with good holding ground for large vessels. Anchorage may also be obtained eastward of Pandan and Kechil, also in a position with the black beacon 3½ cables northward of Ujong Ama Paloe, bearing 084°, and Pandan, 003°, in a depth of 23 fathoms ($42^{m}1$). Small craft will find good anchorage westward of Kechil and close off the town.

Anchoring within a distance of about 55 yards ($50^{m}3$) of the submarine cable is prohibited.

A vessel should approach the entrance to Sinabang baai with the

Charts 2778, 2760, 748b.

Chart 3849, plan of Sinabang bay and Telok Lingi.

light-structures on Ujong Babang and Pandjang kechil in line, bearing 209°, passing between the two beacons north-north-eastward of Ujong Babang. She should give Ujong Babang (*Lat.* 2° 31′ *N., Long.* 96° 24′ *E.*) a berth of about 2 cables, thence pass eastward of Pandjang kechil, and thence steer for the anchorage.

Sinabang.—Sinabang is the headquarters of an Administrator.

There are two piers, and a small boat harbour with a crane, with a lifting capacity of 5 tons. There is a patent slip and facilities for the repairs of small craft.

There is a resident medical officer.

There is regular communication by steamer with other ports in the island and with those in Sumatra.

Charts 3849, plan of Sinabang bay and Telok Lingi, 2778.

Coast.—The foul ground which projects north-north-eastward from Ujong Babang extends eastward to within about 4½ cables of Simanangah, a low islet, covered with scrub and coconut palms, situated about 2½ miles eastward of Ujong Babang. Thence the edge of the foul ground trends for about 3 miles south-eastward to Ujong Lataling, a low point. Biawak and several other islets lie on the foul area south-eastward of Ujong Babang.

A 2-fathom ($3^{m}7$) patch, not marked by discolouration or by breakers, lies 5½ cables south-westward of Simanangah.

Vessels should not attempt to pass between Simanangah and the coast of Simeuloe.

Boera (Bura), a hill, 919 feet ($280^{m}1$) high, with a pointed top, lying 3¼ miles south-south-eastward of Ujong Babang, and about 1¼ miles from the coast, is noticeable.

Chart 2778.

About 2 miles south-eastward of Ujong Lataling is Ujong Mata Toeabing, the low western entrance point of Telok Panaroesan, which, together with Kuala Anao, a continuation of it south-eastward, separates Batu Belajar (Belayar), an island, 262 feet ($79^{m}9$) high at its south-eastern end, from the main island. This passage, however, is much encumbered with rocks and is impracticable, except for praus.

The north-eastern and south-eastern sides of Batu Belajar are fringed by a reef which extends about half a mile from its north-eastern side.

Chart 3849, plan of Labuan Bajau and approach.

Batu Belajar (Belayar rock) is a remarkable rock of dark stone, 47 feet ($14^{m}3$) high, lying near the outer edge of the reef which extends half a mile from the eastern point of the island of the same name, with two rocks which dry, and one above water between. From a distance it appears as a sailing vessel.

Laboean Badjau.—Laboean Badjau (Labuan Bajau), entered between Ujong Salingar, situated 2¾ miles south-westward of Batu Belajar, and Ujong Laboean Badjau, 5½ cables southward, affords a secure and sheltered anchorage during the South-west monsoon, in a depth of about 13 fathoms ($23^{m}8$). On the south-western side of the inlet is Laboean Badjau village, and there are scattered houses on the western and southern sides.

The inlet is clear of danger except for the shore reef, which, from the entrance points, extends about 1½ cables.

Coast.—Ujong Matankeli (*Lat.* 2° 22′ *N., Long.* 96° 30′ *E.*), a low

Charts 2760, 748b.

Chart 3849, plan of Labuan Bajau and approach.

point, about 1½ miles south-south-eastward of Ujong Laboean Badjau, has two small noticeable peaks within it. The bottom in the approach to this point, and also to Laboean Badjau, consists of stones, and the depths are irregular.

Chart 2778.

NORTH-WESTERN AND SOUTH-WESTERN SIDES OF SIMEULOE.—Coast.—Dangers.—Between Ujong Liwa (page 261) and Ujong Paparas, 5½ miles south-south-westward, the coast is fringed by a bank, with depths of 6 fathoms ($11^{m}0$) and less, on which there are several islets, extending from half a mile to 3 miles offshore. Ina, the northernmost islet, lies 2½ miles westward of Ujong Liwa (*Lat. 2° 55′ N., Long. 95° 47′ E.*) and about 1½ miles offshore.

Chart 3871, plan of Approach to Simalandan bay.

Alafoeloe (Alafulu), about 1¼ miles southward of Ina, is noticeable on account of its conical shape. Tepi, the southernmost islet, lies about half a mile southward of Alafoeloe and about 3 cables offshore; it is low, with some coconut palms on it, and is fringed by a reef.

Chart 3871, plans of Simalandan bay and approach.

Simalandan baai.—Dangers.—Simalandan baai is entered between Ujong Paparas and Ujong Araman, 2¾ miles west-south-westward; its shores are mostly fringed by reef, which dry in places and are steep-to.

Ujong Araman is wooded and easily identified, appearing as a high steep point. About 1½ miles eastward of it is Langi village, close westward of which Sungei Silolo discharges. Three square rocks lie close off the southern shore, about 4 cables westward of the village, and between is a sandy beach.

Si Ambong Ambong consist of three flat rocks, two of which are 5 feet ($1^{m}5$) high and the third just above water, lying about one mile west-south-westward of Ujong Araman.

A 4½-fathom ($8^{m}2$) patch lies about 1¼ miles north-north-eastward of Ujong Araman. Simalandan rif, with a depth of 3 fathoms ($5^{m}5$), lies about 6 cables northward of Langi, with a channel about 2 cables wide between it and the shore reef; it breaks only in a heavy sea. A rock, with a depth of 3 feet ($0^{m}9$), lies about midway between them. A 3¾-fathom ($6^{m}9$) patch lies about half a mile northward of the reef.

Pandjang, the largest island in the bay, is separated from the southern shore by a passage about one cable wide. There are some coconut palms on the western and southern sides of the island.

Along the southern side of the bay eastward of Langi there are several rocks which dry, lying on the shore reef and in the passage southward of Pandjang. Eastward of the island and near the head of the bay are the islets of Selaneh Oendoen (Undun), and Anahoh, from each of which foul ground extends seaward; the depths in this vicinity are irregular with a rocky bottom.

Anchorage.—Directions.—Anchorage may be obtained during the North-east monsoon between Simalandan rif and Pandjang, also southward of Simalandan rif. Vessels should approach the bay with the summit of Pandjang bearing 135°, until it is about one mile distant, when course may be altered as necessary for the anchorage.

The anchorage southward of Simalandan rif may be approached with the three square rocks westward of Langi bearing 180°, until

Chart 3871, plans of Simalandan bay and approach.

the coconut palms on the western side of Pandjang, bear 099° which may then be steered for on that bearing, which will lead to the anchorage.

Chart 2778.

Coast.—Between Ujong Araman (*Lat. 2° 49′ N., Long. 95° 43′ E.*) and Ujong Soembeu (Sumbo), a low point about 3½ miles south-south-westward, the hills descend to the coast. Thence to Ujong Toebah (Tubah), a high point about 1¾ miles south-south-eastward, foul ground extends about one mile offshore.

Outlying banks.—A 7-fathom ($12^{m}8$) patch lies 4¼ miles west-north-westward of Ujong Soembeu, and another, with the same depth, 7 miles south-westward of Ujong Toebah. A 9-fathom ($16^{m}5$) patch lies about 8½ miles southward of Ujong Toebah.

Coast.—Dangers.—Telok Dalam is entered between a point about three-quarters of a mile eastward of Ujong Toebah and Batu Lanteng, a rock lying on the coastal reef about half a mile farther eastward. There is a least depth of 3 fathoms ($5^{m}5$) in the entrance, and only small vessels with local knowledge should use this inlet.

Lakon, a noticeable hilly wooded island, lies about 4 cables offshore, 2 miles south-eastward of Ujong Toebah. A bank, with a depth of 7 fathoms ($12^{m}8$) at its outer end, extends about one mile north-westward from the island, and there is foul ground between the island and the main island. There is a village on the northern side of the island. Vessels should not attempt to enter the bay with bad visibility.

Lakon and Oedjoeng (Ujung) are two noticeable hills lying near the west coast of Simeuloe, north-eastward and south-eastward, respectively, of Lakon island.

Anchorage may be obtained in fine weather northward of Lakon island, with Batu Lanteng bearing 346°.

Ujong Aloajan (Aloayan), a low point, with a few dead trees on it, lies about 9 miles south-eastward of Ujong Toebah. A cove is entered between Ujong Aloajan and Ujong Oesoej (Usuy), a low point about 2¼ miles east-south-eastward. A 4-fathom ($7^{m}3$) patch lies in the southern approach to the cove, about one mile south-eastward of Ujong Aloajan, and a 3¾-fathom ($6^{m}9$) patch lies about three-quarters of a mile south-south-westward of Ujong Oesoej. A shoal, with a depth of 5½ fathoms ($10^{m}1$), lies about one mile south-south-westward of Ujong Aloajan, and about half a mile south-eastward of this shoal is one with a least depth of 6 fathoms ($11^{m}0$); the bottom is irregular in this vicinity, and there may be less depths off this point.

Off-lying reef.—Sofan, a reef with a least depth of 2¼ fathoms ($4^{m}1$), lies 3½ miles southward of Ujong Aloajan; in rough weather heavy seas break over its whole extent, and even in fine weather the sea breaks on parts of it.

Coast.—Ujong Oesoej and Ujong Mata Bano, about 3 miles south-eastward, are the entrance points of a bay, in the entrance to which is Linggam, an island covered with coconut palms; it is fringed by a reef, which extends to the head of the bay.

Chart 3871, plan of Channel between Simalur and Simalür Chut.

Between Ujong Mata Bano and Ujong Karang (*Lat. 2° 34′ N., Long. 95° 57′ E.*), about 4½ miles east-south-eastward, the coast is fringed by a bank, on which there are some patches which dry and which, with depths of less than 6 fathoms ($11^{m}0$), extends from 1½ to 8 cables offshore.

Charts 2760, 748b.

Chart 3871, plan of Channel between Simalur and Simalur Chut.

Simeuloe (Simalur) village stands at the head of a cove, about 1½ miles north-westward of Ujong Karang. Small craft may obtain anchorage in the cove.

The coastal bank, with depths of less than 3 fathoms (5^{m}5), on which the sea breaks, extends 6½ cables south-westward from Ujong Karang.

Laroe-eu (Larü-ö) or Raban baai, entered between Ujong Siandoek (Sianduk), situated about half a mile eastward of Ujong Karang, and Ujong Lambajo, about 2½ miles farther eastward, affords anchorage, in depths of from 6 to 9 fathoms (11^{m}0 to 16^{m}5), mud or sand. A bank, with depths of less than 3 fathoms (5^{m}5), extends 9 cables eastward from Ujong Siandoek.

Off-lying island and dangers.—Simeuloe Tjoet (Simalur Chut), an island, 295 feet (89^{m}9) high, and covered with coconut palms, lies about 1½ miles southward of Ujong Karang; it is fringed by a reef, and from its western and eastern extremities a bank, on which the sea breaks, extends nearly one mile westward and eastward, respectively. The island is inhabited by Malays and Chinese.

Good anchorage may be obtained in Telok Lanteng, on the northern side of the island, abreast the village there, which is the principal place for native traffic on the south-western coast of Simeuloe.

Antjing (Anching), a shoal with a depth of 3 fathoms (5^{m}5), lies about 2½ miles west-north-westward of Ujong Sawang Boeloe (Bulu), the north-western point of Simeuloe Tjoet.

A 2½-fathom (4^{m}6) patch lies half a mile northward of Ujong Rentjong (Renchong), the northern extremity of Simeuloe Tjoet, with a clear channel between. Rindoe (Rindu), a shoal, with a depth of 3½ fathoms (6^{m}4), lies about 1¼ miles north-north-eastward of Ujong Sitoenkool (Situnkul), the eastern extremity of Simeuloe Tjoet. Between this shoal and Ujong Siandoek there are several 3-fathom (5^{m}5) patches, which are usually marked by breakers, but not by discolouration.

A 5-fathom (9^{m}1) patch lies about 2¾ miles east-south-eastward of Ujong Sitoenkool (*Lat. 2° 31′ N., Long. 95° 58′ E.*).

Chart 2778.

Coast.—Dangers.—Lauheh baai, entered between Ujong Lauheh, situated about 4 miles eastward of Ujong Lambajo, and Ujong Matatohtoh, 1½ miles east-south-eastward, affords shelter for vessels with local knowledge behind the off-lying reefs, on which the sea constantly breaks. Ujong Matatohtoh may be identified by a few casuarina trees on it.

Deh, a reef, with depths of less than 6 feet (1^{m}8), lies about 1¼ miles south-south-westward of Ujong Matatohtoh, and some sunken rocks lie about midway between Deh and Ujong Lauheh.

Ujong Batu Tangkalang, 3½ miles south-eastward of Ujong Matatohtoh, is wooded with coconut palms. A reef, with depths of less than 5 fathoms (9^{m}1), extends about three-quarters of a mile south-westward from the point.

Soelang (Sulang), a reef, on which the sea breaks, with a depth of 2¼ fathoms (4^{m}1), lies about 3½ miles south-westward of Ujong Batu Tangkalang.

Chart 3849, plan of Tepak bay.

Tepak baai and approaches.—Dangers.—Tepak baai is entered between Ujong Lasingaloe, situated 7½ miles south-eastward of Ujong

Chart 3849, plan of Tepak bay.

Batu Tangkalang, and Ujong Kakat (*Lat. 2° 21′ N., Long. 96° 19′ E.*), a rocky point, about 7½ miles south-eastward. The shore is fringed by a reef which extends about three-quarters of a mile off in places, and on which there are some rocks which dry.

A shoal, with a least depth of 2¾ fathoms ($5^{m}0$), lies nearly one mile offshore about 2¼ miles north-westward of Ujong Lasingaloe.

Lessikin, on the eastern shore of the bay, is the principal village.

Telok Gosong, a small bay on the eastern side of Tepak baai, is foul for nearly one mile from its head. Koeloengan (Kulungan), 656 feet ($199^{m}9$) high, lies 7 cables north-north-eastward of Ujong Poesoeng (Pusung), the northern entrance point of Telok Gosong.

Tepak is a hilly island fringed by a reef lying 4¼ miles southward of Ujong Lasingaloe. Mintjau (Minchau), an island three-quarters of a mile westward of Tepak, is lower than that island; a bank with depths of less than 6 fathoms ($11^{m}0$), extends 1¾ miles south-westward from its western side; patches which dry lie about a quarter of a mile from its north-western extremity, and a 4½-fathom ($8^{m}2$) patch lies 1½ miles west-north-westward of the same point; a wooded rock lies close off its north-eastern point. There is a least depth of 6 fathoms ($11^{m}0$) in the fairway between the two islands.

Siavelak is a low coral islet covered with scrub, and a single tree standing on it, situated about 1½ miles southward of Ujong Lasingaloe. It is fringed by a reef, and foul ground, at the outer end of which is a 3-fathom ($5^{m}5$) patch, extends about 1½ miles south-south-eastward, and there are detached patches about 2¼ miles east-south-eastward of the islet. The coastal reef extends about one mile southward from Ujong Lasingaloe, with a 2¾-fathom ($5^{m}0$) patch lying 6½ cables southward of the point. The passage between this reef and that extending northward from Siavelak is narrow and should not be used.

Sentariw (Centario), a reef, over which there is a depth of 2¼ fathoms ($4^{m}1$), is steep-to, and lies 1¼ miles north-eastward of the north-eastern extremity of Tepak. It can sometimes be distinguished by breakers, or by discolouration.

A reef, on which the sea breaks, extends about 3 cables north-westward from Ujong Naboeloe-oen (Nabulu-un), the southern entrance point of Telok Gosong. A reef, known as Gosong Amili, on which the sea breaks, extends 6 cables from the eastern shore of Tepak baai, westward of Koeloengan hill.

Anchorages.—Directions.—Anchorage may be obtained off Lessikin, in a depth of about 10 fathoms ($18^{m}3$), with Ujong Naboeloe-oen bearing about 170°, just open of Ujong Okas, about 1¾ miles northward.

Anchorage may also be obtained, in a depth of about 9 fathoms ($16^{m}5$), northward of Mintjau, half a mile north-westward of the wooded rock close off its north-eastern point.

A vessel approaching from westward should steer for the summit of Tepak, bearing 135°, passing thence southward and eastward of Sentariw.

Chart 2778.

Coast.—Dangers.—About 3 miles eastward of Ujong Kakat is Ujong Toebah (Tubah) (*Lat. 2° 20′ N., Long. 96° 22′ E.*), and 4½ miles farther eastward is Ujong Massin, the southern extremity of Simeuloe. Karang Oedjoeng Toebah (Ujong Tubah), with a least depth of

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Chart 2778.

4 fathoms ($7^{m}3$); lies about 1¾ miles offshore and 3¼ miles south-eastward of Ujong Toebah. Ujong Latioen lies 2½ miles east-north-eastward of Ujong Massin. A 3-fathom ($5^{m}5$) patch lies just inside the 6-fathom ($11^{m}0$) line about 1½ miles southward of Ujong Latioen, and 2¾ miles south-eastward of the same point is the outer edge of the coastal bank with a depth of 7 fathoms ($12^{m}8$), which extends offshore between this point and Ujong Matankeli, 1¾ miles north-eastward.

For the coast northward of Ujong Matankeli, *see* page 268.

Outlying islands and dangers.—Lassia lies about 12½ miles south-eastward of Ujong Matankeli, and Babi 1½ miles southward of Lassia. Both islands are low and densely wooded, and are mostly steep-to, but a reef, with depths of less than 5 fathoms ($9^{m}1$), usually marked by discolouration or breakers, extends about 1¼ miles from the south-eastern side of Babi.

On the north-eastern side of Babi there is a noticeable house with a zinc roof, about 2 miles north-westward of Ujong Oloel (Olul) Sawah, the eastern extremity of the island. Landing may sometimes be effected here, and off Ujong Pasir Tinggih, about one mile south-eastward, also on the south-eastern side of Lassia, and in Telok Atjeh (Acheh) on the north-eastern side, but there are rocks in the vicinity of all these landing places.

There is no good anchorage off these islands, the most sheltered is off the south-eastern side of Lassia, southward of Ujong Ngaroe (Ngaru), its eastern extremity, in a depth of about 30 fathoms ($54^{m}9$).

Telok Atjeh is foul, but small craft with local knowledge may anchor at its southern end; it is, however, an unsafe anchorage.

The passage between the two islands is clear of danger, except for a 5-fathom ($9^{m}1$) patch which is not marked by discolouration or by breakers, about a quarter of a mile northward of the northern side of Babi.

There is a constant south to south-easterly current with a maximum rate of 1½ knots in the vicinity of these islands.

Suffolk reef, with a depth of 2½ fathoms ($4^{m}6$), coral, lies 3½ miles north-eastward of Ujong Ngaroe; it was discovered in 1823, by a vessel of the same name, and it is usually marked by discolouration.

A 6-fathom ($11^{m}0$) patch, not marked by discolouration or breakers, lies about 3¼ miles north-north-eastward of Ujong Ngaroe.

Chart 3850.

BANJAK EILANDEN.—Banjak (Banyak) eilanden are a group lying within about 40 miles south-westward of Ujong Pasir Gala (page 260), the three largest being Toeangkoe (Tuangku), Bangkaroe (Bangkaru), and Oedjoeng Batoe (Ujong Batu), besides which there are many islets with deep channels between them. Toeangkoe and Bangkaroe are densely wooded, but the others are only covered with brushwood and coconut palms. Pandjang, an island of the Pulau Delapan group, forming the eastern part of the Banjak eilanden, is the most important, on account of the anchorage in Reede Pandjang off its northern end, where the principal trade of the islands is carried on. *See* view facing page 260.

The inhabitants, who are all Muhammadans, are a mixture of Achinese, Malays, Niassers, and Chinese, who are employed almost

Charts 2760, 748b.

Chart 3850.

exclusively on coconut cultivation and fishing. Malaria is very prevalent.

Tidal streams.—Current.—In the channel between Bangkaroe and Toeangkoe, the tidal streams set north-westward and south-eastward; westward of Bangkaroe they set west-north-west and east-south-east at a rate of about three-quarters of a knot, and in the channel immediately northward of Toeangkoe, they set westward and eastward.

A south-east-going current sets between the islands northward of Toeangkoe and a south-south-east-going current along the eastern side of Toeangkoe, at a maximum rate of 1¼ knots; also in the channel westward and southward of Pulau Delapan it sets south-eastward.

Bangkaroe.—Dangers.—Bangkaroe, the south-westernmost island of the group, lies 23 miles eastward of Babi, with a deep channel free from danger in the fairway between them, but vessels are recommended to keep on the Bangkaroe side. The island is hilly; at its northern end is Amintolan (*Lat. 2° 06′ N., Long. 97° 06′ E.*), 994 feet ($303^{m}0$) high, and at the southern extremity is Lakita, 499 feet ($152^{m}1$) high; there is a valley in the middle which, from a distance, makes it appear as two islands. From eastward and south-eastward, the peak Brassi, 505 feet ($153^{m}9$) high, on the northern side of Telok Brassi, on the south-eastern side of the island, appears very similar to the conical hill, named Amadangan, 643 feet ($196^{m}0$) high, on the south-western side of the island.

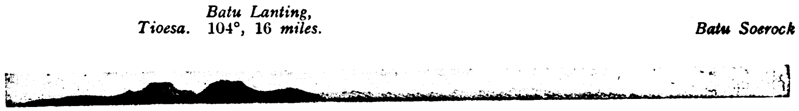
Gosong Pelangaran is an extensive reef lying half a mile off the western extremity of Bangkaroe; about 3 cables southward of it are some rocks which dry. The reef is always clearly visible.

A shoal, with a depth of 2 fathoms ($3^{m}7$), lies about 4 cables northward of the southern entrance point of Telok Brassi, and a 5-fathom ($9^{m}1$) patch, which is steep-to, lies about one mile eastward of the shoal. These shoals are seldom marked by discolouration.

A spit, over which there are depths of from 5 to 9 fathoms, extends 2 miles eastward from Ujong Lakita, the southern extremity of Bangkaroe.

Anchorages.—Anchorage may be obtained in the northern part of Telok Brassi, known also as Kameleon baai, in depths of from 14 to 19 fathoms ($25^{m}6$ to $34^{m}7$), and in Telok Asin, on the north-western side of Bangkaroe, but this latter anchorage is exposed to north-westerly winds. Telok Asin may be identified by Batu, a wooded islet, 144 feet ($43^{m}9$) high, lying about 3 cables westward of Ujong Asin, the northern entrance point of the bay, with foul ground between.

Toeangkoe.—Toeangkoe, the largest island of the Banjak group, is hilly on its northern and western sides, but low and overgrown with mangroves on the eastern; it is indented with several bays on its eastern side, but with the exception of Telok Tambego and Telok Batoea (Batua) on the north-eastern side, they are encumbered with reefs in the approach.



Toeangkoe from west-north-westward.

(*Original dated* 1929.)

Charts 2778, 2760, 748b.

Chart 3850.

The channel between Bangkaroe and Toeangkoe is 5 miles wide, deep, and free from danger to within half a mile of either side.

Tioesa (Tiusa), about 3½ miles westward of Ujong Sialik (*Lat. 2° 14′ N., Long. 97° 18′ E.*), the north-eastern extremity of the island, is 1,027 feet (313^{m}0) high, and the highest peak of the island. Batu Lanting, 761 feet (231^{m}9) high, lies close to the northern coast, about 3½ miles eastward of Ujong Silingar, the western extremity of the island. Tambego, 528 feet (160^{m}9) high, and conical, lies close to the north-eastern coast, about 1½ miles southward of Ujong Sialik. Batu Soeroek (Suruk), on the south-western coast, about 7 miles east-south-eastward of Ujong Silingar, is 495 feet (150^{m}9) high, and very prominent. On the low neck of land, 1¼ miles northward of Ujong Lolok, the southern extremity of the island, there is a noticeable tree.

South-western side of Toeangkoe.—Coast.—The south-western coast is generally steep and affords very little shelter. Ujong Silingar is low. A 7-fathom (12^{m}8) patch lies about 2¼ miles westward of it, and a bank, with depths of less than 6 fathoms (11^{m}0), extends about 6 cables offshore, about three-quarters of a mile south-eastward of the point.

Telok Limau is a narrow inlet extending northward on the eastern side of Batu Soeroek. Sunken reefs extend a short distance from both entrance points, between which there are depths of 7 fathoms (12^{m}8), decreasing gradually to 3 fathoms (5^{m}5), sand and mud, towards the head. Two rivulets flow into the head of the inlet. Small craft may obtain anchorage at the head, but there is little shelter. They may also find shelter in Telok Anarin besar, about 2 miles south-eastward of Ujong Limau, the south-eastern entrance point of Telok Limau, eastward of a small islet; they should enter the bay from westward. The islet lies about 4 cables offshore on a bank, with depths of less than 3 fathoms (5^{m}5).

Telok Mariabah, at the south-eastern end of the island, is entirely open to the swell and there is little room for anchorage.

Northern and eastern sides of Toeangkoe.—Coast.—Dangers.—Beacons.—The northern coast is hilly and fronted by numerous islands and dangers, the positions of which can best be seen on the chart. The only place of any importance is Aloban, a large village, standing at the foot of Tioesa, which should only be approached by vessels with local knowledge. The channel approaching it from eastward is marked by beacons.

The coast between Ujong Sialik and the entrance to Telok Tambego, about 1½ miles southward, is fringed by a reef, on which there is a rock above water, extending about half a mile offshore. Telok Tambego is sheltered on the east by Pabandah and Doea (Dua), two high and wooded islands, from the eastern sides of which a reef extends about a quarter of a mile. A 6-fathom (11^{m}0) patch lies in the north-eastern approach to the bay, about one mile north-north-eastward of the north-western extremity of Pabandah, with a 7-fathom (12^{m}8) patch between. The bay is clear of dangers, except for a rock, which dries, in the northern part.

Telok Batoea (Batua) is a narrow inlet with considerable depths, entered between Ujong Batoea, about 4 miles south-south-eastward of Ujong Sialik, and Ujong Baka, about three-quarters of a mile farther in the same direction. Between Ujong Baka (*Lat. 2° 10′ N., Long.*

Chart 3850.

97° 20′ E.) and Ujong Lolok foul ground extends about three-quarters of a mile offshore in places. Samoet (Samut), a high, dark-coloured and conspicuous islet, lies on this foul ground, about 2 miles southward of Ujong Baka. Several shoals, with depths of from 2½ to 6 fathoms ($4^{m}6$ to $11^{m}0$), lie within 1¾ miles of this stretch of coast.

Two reefs, separated by a deep narrow channel, lie from about 1½ to 2 miles off the middle of the north-eastern coast of Toeangkoe; on the north-western reef there is a patch which dries near the north-western end, and on the south-eastern reef there are two drying patches.

Pinang, an island, with a rock above water close off its south-eastern side, is connected to the south-eastern end of Toeangkoe by a ridge, over which there is a least depth of 4 fathoms ($7^{m}3$) in mid-channel.

Sarang Aloe (Alu), an island 3 miles southward of Pinang, is fringed by a reef. A spit, with depths of less than 10 fathoms ($18^{m}3$), extends 3½ miles south-eastward from it, with a 4½-fathom ($8^{m}2$) patch near its outer end.

Anchorages.—Directions.—Anchorage may be obtained on the western side of Telok Dalam, the large inlet between Batu Lanting and Tioesa, where some shelter may be had from the ocean swell.

Small craft with local knowledge may obtain anchorage off Aloban, (*Lat. 2° 14′ N., Long. 97° 14′ E.*), close to which there is a pier.

Approaching from westward, after rounding Ujong Silingar, a vessel should pass southward of Gusong Poenaga (Punaga), a reef with a depth of 3 fathoms ($5^{m}5$) marked by discolouration, lying about 3 miles north-eastward of the point, thence to the anchorage in Telok Dalam, or, if proceeding to Aloban, should pass through the narrow channel between the islands of Simok and Linon, both overgrown with mangroves, north-westward of Aloban, and thence to the anchorage. After passing through this channel the vessel should keep close to the fringing reef of Simok, which is always visible.

The depths are very irregular off the northern coast of Toeangkoe, and vessels, unless proceeding to the anchorages mentioned above, are recommended not to come southward of the parallel of 2° 22′ N.

Good anchorage may be obtained in Telok Tambego. A vessel approaching from eastward should pass about a quarter of a mile southward of Lamboedong (Lambudong), a low islet, fringed by a reef, about 3 miles north-eastward of Ujong Sialik, thence she should keep the south-eastern extremity of Tambego hill in line with the 558-foot ($170^{m}1$) summit, 2 miles south-westward, bearing 225°, thence in mid-channel between Tambego hill and the north-western end of Pabandah, and thence to the anchorage in Telok Tambego.

Approaching from southward, the vessel should pass north-westward of Sarang Aloe and eastward of Pinang, thence keep the eastern extremities of these islands in line astern, bearing 185°, until the noticeable tree on the low spit of land at the southern end of Toeangkoe is in line with the south-eastern extremity of Sarang Gantong, situated 2 miles north-north-eastward of Ujong Lolok, when she should steer 326° and pass between Ujong Baka and the reef, which dries, about 1½ miles north-eastward, thence keep Lamboedong in line with the noticeable tree on Biawak (page 277), an islet 2 miles northward of it, bearing 356°, thence round the 6-fathom ($11^{m}0$) patch north-eastward of Pabandah, and thence as for a vessel approaching from eastward.

Charts 2778, 2760, 748b.

Chart 3850.

Islands and dangers north-eastward of Toeangkoe.—Channel.—Between the numerous islands and reefs extending about 6 miles north-eastward from the north end of Toeangkoe, and Pulau Delapan, is a deep channel about 2½ miles wide, which turns eastward between the southern extremity of Pulau Delapan and Palambak besar, where it is about 1½ miles wide between the 6-fathom ($11^{m}0$) lines on either side. It is one of the principal channels used by vessels navigating the coast, and it gives access to Reede Pandjang (*see* below).

On the western side of this channel, about 4 miles northward of Ujong Sialik, lying on the foul ground, is Sikandang, an island, 197 feet ($60^{m}0$) high. About 1¾ miles south-eastward of the southern extremity of Sikandang is Biawak (*Lat. 2° 17′ N., Long. 97° 20′ E.*), a low islet, on which there is a noticeable tree, lying on the edge of the foul ground, and about one mile south-south-westward of this islet is Asok, another low islet. For Lamboedong, about 1¼ miles south-eastward of Asok, *see* page 276.

Pulau Delapan includes Oedjoeng Batoe (Ujong Batu), Baleh, Bagoe (Bagu), Tepoe Tepoes (Tepu Tepus), Pandjang, Rangit besar and Rangit kechil, all low islands except the first ; there is, however, a noticeable hill, covered with scattered coconut palms, with its western slope a light green colour, near the northern end of Pandjang. The whole group lies on an extensive reef and the islands are covered with coconut palms. The edge of the reef forming the eastern side of the channel is well marked by discolouration.

About 3 miles southward of Rangit besar is Palambak besar with Palambak kechil about one mile eastward of it. Palambak besar is a hilly island covered with coconut palms and surrounded by foul ground, which extends about 1¼ miles southward and 5½ miles north-westward to within about one mile of Lamboedong. Gusong Sĭandjai lies on this foul ground, about 2 miles westward of the western extremity of Palambak besar ; it is the only cay in the vicinity that is wooded. Palambak kechil is a low island fringed by a reef, which extends about 3 cables southward and is steep-to. From its northern end a bank, with depths of less than 5 fathoms ($9^{m}1$) extends 1½ miles north-north-westward.

There are villages on the south-eastern extremity of Bagoe, the southern extremity of Baleh, and on the eastern side of Pandjang.

Reede Pandjang.—Reede Pandjang, off the northern end of Pandjang, affords anchorage for small vessels with local knowledge, in a depth of about 19 fathoms ($34^{m}7$), with the south-eastern extremity of Baleh bearing 017°.

The anchorage should be approached from westward, with the north-western extremity of Matahari, an island, 210 feet ($64^{m}0$) high, and covered with coconut palms, situated 2½ miles northward of Toeangkoe, bearing 273°, astern, just open of the southern extremity of Sikandang. Timboel (Timbul), a wooded cay, lies on the edge of the reef extending westward from the northern end of Pandjang, and is a good mark.

There is regular communication by steamer with ports in Sumatra.

Islets and dangers between Pulau Delapan and coast of Sumatra.—Beacon.—Djawi Djawi (Jawi Jawi), is a small sandy cay, covered with vegetation, lying on a reef marked by discolouration and several rocks, 6½ miles westward of Ujong Pasir Gala (page 260) ; it is situated at the north-eastern end of a bank, which extends about

Charts 2778, 2760, 748b.

Chart 3850.

4¾ miles south-westward, and on which there is an islet and several patches which dry. Another extensive bank, on which there is a patch which dries near its northern end, is separated from the western side of the bank mentioned above by a deep channel, except for a 4½-fathom (8m2) patch near the middle, with a least width of 6 cables between the 10-fathom (18m3) lines. The channel between the western edge of this bank and the reefs extending from the eastern side of Pulau Delapan is about 2 miles wide, and is preferable to that eastward of Djawi Djawi, being clear of dangers and wider.

There are several detached shoals, with depths of from 3 to 6 fathoms (5m5 to 11m0), northward of these banks, and a one-fathom (1m8) patch lies 2¾ miles southward of Djawi Djawi (*Lat. 2° 23′ N., Long. 97° 33′ E.*).

Between Djawi Djawi and the coast of Sumatra there are numerous shoals with deep channels between them. A patch, which dries, lies 2¼ miles eastward of Djawi Djawi, and is marked by a black cone beacon on its south-eastern side. The channel between Djawi Djawi and this patch is used by vessels proceeding to Singkel from northward and *vice versa*, but in its northern approach there is a 4-fathom (7m3) patch lying 1½ miles north-north-eastward of Djawi Djawi. Vessels using this passage should keep to the western side, as the reef on which Djawi Djawi lies, is always visible.

Aroem Pandjang (Arum Panjang), over which there is a depth of 3¼ fathoms (5m9), lies about 6¾ miles south-south-eastward of Djawi Djawi and about 5¼ miles offshore; it is not marked by discolouration.

Between the coast and the easternmost shoal patches lying eastward of Djawi Djawi, is a clear channel with a least depth of 7 fathoms (12m8). Vessels using this passage should keep fairly close inshore, as the shoal patches are not marked by discolouration.

REEDE SINGKEL AND APPROACHES.—Dangers.—Buoy.—Beacon.—Lights.—Ujong Singkel, 8½ miles south-south-eastward of Ujong Pasir Gala, may be identified by some dead trees standing in the sea close off it. From it a spit, with depths of from one to 3¼ fathoms (1m8 to 5m9), extends 3 miles south-westward.

Chart 3870, plan of Singkel road.

Noord Daphne rif, with a depth of 4 feet (1m2), coral and steep-to, lies 3¾ miles south-south-eastward of Ujong Singkel, and is marked by a white beacon surmounted by a ball.

A light is exhibited, at an elevation of 67 feet (20m4), from a white iron framework structure, 69 feet (21m0) in height, 2¾ cables northward of the head of the eastern pier.

Reede Singkel is situated off the mouth of Singkel rivier and of the village of the same name. The limit of the roadstead is the arc of an imaginary circle with a radius of 2 miles, and the light-structure as centre.

There are two piers, one of which is occasionally lengthened on account of silting which takes place, 3 cables southward of the lighthouse, and the other on the western side of the river mouth.

A light is exhibited, at an elevation of 25 feet (7m6), from a wooden post, about 1¼ cables south-westward of the cable house, situated about 5½ cables eastward of the eastern pier.

A mooring buoy, exhibiting a *white fixed* light, is moored about 3¾ cables southward of the head of the eastern pier.

Charts 2778, 2760, 748b.

Chart 3870, plan of Singkel road.

Anchorages.—Anchorage may be obtained, in a depth of $4\frac{1}{4}$ fathoms ($7^{m}8$), mud, with the main light-structure bearing 000°, and the light-post south-westward of the cable house, 070°. Also off the mouth of the river, in a depth of about 8 fathoms ($14^{m}6$), mud, with Ujong Pasir, situated $2\frac{1}{2}$ miles east-south-eastward of Ujong Singkel, bearing 020°, and Ujong Ketapan (*Lat. 2° 16′ N., Long. 97° 45′ E.*), situated $1\frac{1}{4}$ miles south-eastward of Ujong Singkel, 301°, but this berth is very exposed during the South-west monsoon.

In 1937, the bank extending from the eastern entrance point to Singkel rivier was reported to be extending southward.

Submarine cables.—Submarine cables are landed about half a mile eastward of the eastern pier and run in a northerly and southerly direction as indicated on the chart. Vessels should avoid anchoring in their vicinity.

Singkel rivier.—Singkel rivier, which discharges on the eastern side of Ujong Pasir, is the largest river on the west coast of Sumatra, but owing to its shallow mouth is of no use to shipping. Above Singkel, as far as its junction with Simpang Kiri and Simpang Kanan, 12 miles up, the depth varies from about $1\frac{1}{2}$ to 4 fathoms ($2^{m}7$ to $7^{m}3$), and the width from about $2\frac{1}{4}$ to $2\frac{3}{4}$ cables. In Simpang Kanan there are depths of from 6 to 12 fathoms ($11^{m}0$ to $21^{m}9$), as far as the village of Tandjoeng Emas, 14 miles above its confluence with the Simpang Kiri.

The only communication between the roadstead and Singkel is by a narrow channel, about 30 feet ($9^{m}1$) wide and a depth of less than one foot ($0^{m}3$), connecting the eastern side of the river mouth with a lagoon, on the northern shore of which Singkel is situated.

Singkel.—The village of Singkel is the residence of an Administrator. It is the shipping place for timber and forest produce. There is regular communication by steamer with other ports in Sumatra.

Charts 2778, 2760, 748b.

CHAPTER VIII

SUMATRA, WEST COAST—SINGKEL TO AJERBANGIS AND OFF-LYING ISLANDS

Chart 2760.

COAST.—The coastal plain between Singkel and Padang, about 250 miles south-eastward, is generally narrow, being backed by mountains with numerous peaks. Between Singkel and Baroes, 40 miles south-eastward, the coastal plain is fairly wide, but thence to Ajerbangis, about 125 miles farther south-eastward, the mountains gradually approach the coast; thence to Tikoe, about 50 miles farther, there is a large marshy plain, densely wooded and sparsely inhabited; between Tikoe and Padang the coast is thickly populated and well cultivated.

The rivers are generally small and of little importance.

Off the whole of this coast there are numerous reefs and islands, some of which rise steeply from the 100-fathom ($182^{m}9$) line.

For general remarks on the coast south-eastward of Padang, *see* page 353.

Local weather.—*See* page 31.

Chart 2778.

Aspect.—Between Singkel (*Lat. 2° 17′ N., Long. 97° 47′ E.*) and Sibolga, 68 miles south-eastward, the coast is low and covered with vegetation, and there are few conspicuous objects. The following mountain peaks are the best marks:—Van Maurikberg, or Selpa, 2,995 feet ($912^{m}9$) high, about 26 miles eastward of Singkel; it is the highest of three summits lying close together, and from southward appears to have a sharp peak, but from westward appears rounded. About 16 miles north-eastward of this mountain is a twin peaked summit, 6,506 feet ($1983^{m}0$) high, but it is seldom visible.

Semanampaloe, 3,455 feet ($1053^{m}1$) high, lies 44 miles south-eastward of Singkel, and at the north-western end of a ridge which runs parallel with, and at a distance of about 3 miles, from the coast. A white patch on the hilly ground about 3½ miles northward of Semanampaloe, is very noticeable. Sigordang, 2,795 feet ($851^{m}9$) high, lies about 5½ miles south-eastward of Semanampaloe; it has a noticeable round summit, and is separated from the ridge north-westward of it by a gap which is sharply defined, especially when seen from south-westward.

Toba, 6,736 feet ($2053^{m}1$) high, lies about 11½ miles north-eastward of Semanampaloe; it is occasionally visible during the morning, or after rain, in the evening.

Coast.—**Dangers.**—Baai van Telaga lies on the eastern side of Ujong Radja (Raja), situated 4½ miles south-eastward of Singkel pier.

Chart 748b.

Chart 2778.

Landing is difficult, as the sea is usually breaking on the whole northern shore of the bay, but it may be effected eastward of Ujong Radja, where the shore is clear of dangers.

A rock, with a depth of one foot ($0^{m}3$), lies about 6½ cables southward of Ujong Radja.

Kasi, a reef which dries, and on which the sea breaks heavily, lies about 2¾ miles east-south-eastward of Ujong Radja. About 2½ miles north-north-eastward of it is Telaga, an islet lying on the southern side of a reef, with foul ground extending about 3½ cables westward from it.

Some sunken rocks, on which the sea breaks heavily, lie 1¼ miles east-south-eastward of Telaga. About one mile, 1¾, and 3 miles southward of these rocks are reefs, with depths of one fathom ($1^{m}8$), 2 fathoms ($3^{m}7$), and 3 feet ($0^{m}9$), respectively.

Anchorages.—Directions.—Anchorage may be obtained off the western shore of Baai van Telaga, in a depth of 6 or 7 fathoms ($11^{m}0$ or $12^{m}8$), or westward of Telaga, in a depth of about 5 fathoms ($9^{m}1$), mud, where a vessel will be sheltered by the land from westerly winds, and by the reefs off the entrance to the bay from south-easterly winds.

Approaching from westward, Ujong Radja (*Lat. 2° 14′ N., Long. 97° 52′ E.*) should be rounded in depths of from 8 to 9 fathoms ($14^{m}6$ to $16^{m}5$), over a hard bottom, to avoid the rock southward of it. Eastward of the point the bottom becomes soft, when course should be altered north-eastward to pass westward of Kasi, and thence to the anchorage.

Coast.—Dangers.—Between Ujong Radja and Ujong Silabi, 27 miles south-eastward, the coast is low, densely wooded, and uninhabited. The off-lying islets are low, and except Telaga, are covered with coconut palms.

Sikandang, an islet about 5½ miles eastward of Kasi, and 1¾ miles offshore, is fringed by a reef. About 2½ miles south-eastward of Sikandang is Birahan, an islet fringed by a reef, which, from its south-eastern side, extends about 3 cables, with a depth of 3 fathoms ($5^{m}5$). About one mile southward of Ujong Mangkir, situated about 16 miles east-south-eastward of Ujong Radja, is Mangkir gedang, and about 1¼ miles farther south-eastward, Mangkir kechil, both fringed by a reef. Lipang is an islet lying on the north-eastern edge of a reef about 1½ miles south-eastward of Mangkir kechil, and about one mile offshore.

Pandjang, an island fringed by a reef which extends about half a mile from its western side, with a rock which dries on its outer end, lies 6¼ miles north-westward of Ujong Silabi, and about 1¼ miles offshore. A 1¼-fathom ($2^{m}3$) patch, marked by discolouration, lies half a mile eastward of the island, and between the island and Ujong Silabi are several reefs, one of which dries, usually marked by breakers, lying about 2¼ miles offshore.

Anchorages.—Directions.—Anchorage may be obtained between Birahan and the coast of Sumatra, in a depth of about 8 fathoms ($14^{m}6$), clay, sheltered to some extent from westerly and south-westerly winds. This anchorage should be approached with Van Maurikberg bearing 047°, which will lead between Haai (page 282) and the 5-foot ($1^{m}5$) patch 3½ miles south-south-eastward of it.

Anchorage may be obtained between Pandjang and the coast of Sumatra, in a depth of 5½ fathoms ($10^{m}1$), sheltered from all winds.

Charts 2760, 748b.

Chart 2778.

The fringing reef extends only a short distance from the northern and north-eastern sides of the island, so that a vessel may anchor within about 2¾ cables from the island.

This anchorage cannot be approached directly from Singkel, but is practicable only from south-eastward, passing southward and westward of Pandjang.

Channel.—Between Ujong Radja and Mansalar, about 48 miles south-eastward, there is a deep channel, with a least width of 6½ miles, lying between a line of detached reefs which extend about 8 miles offshore, and a group south-westward of them, radiating from Lakota, an islet, 18 miles south-westward of Ujong Silabi.

Dangers on north-eastern side of channel.—Buoy.—Zuid Daphne rif, on the north-eastern side of the channel, about 6 miles south-south-eastward of Ujong Radja, has two heads, about half a mile apart, over the western of which there is a depth of 2½ fathoms ($4^{m}6$), and over the eastern, one fathom ($1^{m}8$), with deep water between them; the reef is marked by discolouration.

Haai (*Lat. 2° 08′ N., Long. 98° 01′ E.*), a reef with a depth of 3¼ fathoms ($5^{m}9$), marked by discolouration, lies about 7 miles eastward of Zuid Daphne rif, and between them are several detached patches with depths of from 1¼ to 3¾ fathoms ($2^{m}3$ to $6^{m}9$) and considerable depths between them. Between Haai and Sikandang there is a patch which dries, and two other reefs each with a depth of 3 feet ($0^{m}9$), which show by discolouration.

About 3½ miles south-south-eastward of Haai there is a reef with a depth of 5 feet ($1^{m}5$), whence, extending in a south-easterly direction for about 7¾ miles, is a line of detached reefs, marked by discolouration, with depths of from 5 feet to 2¾ fathoms ($1^{m}5$ to $5^{m}0$), with deep water between them. Doris, a reef with a depth of 3¼ fathoms ($5^{m}9$), lies about 2 miles south-westward of the middle of this line of reefs, and is the south-westernmost danger on the north-eastern side of the channel; it is not marked by discolouration.

Radja Oedat (Raja Udat), consisting of three coral heads, with depths of from 3¼ to 4¼ fathoms ($5^{m}9$ to $7^{m}8$), lie on the north-eastern side of the channel about 3¼ miles south-south-westward of Ujong Silabi, and seldom show by discolouration. A 1¾-fathom ($3^{m}2$) patch lies 2 miles southward of Ujong Silabi.

A black can buoy, surmounted by a truncated cone, is moored on the south-western side of the southern head of Radja Oedat.

Islets and dangers on south-western side of channel.—Light.—Circe, a reef, with a depth of one fathom ($1^{m}8$), marked by discolouration, lies on the south-western side of the channel, 16½ miles south-south-eastward of Ujong Radja. A 3¼-fathom ($5^{m}9$) patch lies 3¼ miles southward of Circe. Boeroeng (Burung), about 4 miles south-eastward of Circe, dries, and is marked by breakers; it consists of sand, coral and stones, and lies on a reef, about 3½ cables long, east and west.

Lakota, a low and wooded islet with coconut palms, is fringed by a reef, which extends about 3 cables from its western side. About 2 miles north-north-westward of it is a 3-foot ($0^{m}9$) patch, and about 1¾ miles west-south-westward is a 1¾-fathom ($3^{m}2$) patch. A 2¾-fathom ($5^{m}0$) patch, marked by discolouration, lies 5½ miles south-westward of the islet. Two 3¼-fathom ($5^{m}9$) patches lie about 3¼ miles north-north-

Charts 2760, 748b.

Chart 2778.

eastward and 4½ miles north-eastward, respectively, of Lakota. A 2½-fathom ($4^{m}6$) patch lies 4 miles east-north-eastward of Boeroeng; this patch is the north-easternmost danger on the south-western side of the channel.

Maha Vajirunhis, with a depth of 3¼ fathoms ($5^{m}9$), lies 5½ miles north-eastward of Lakota. From this danger a line of detached reefs extends 8¼ miles south-eastward; the south-easternmost of these reefs has a depth of one fathom ($1^{m}8$), and it is the south-eastern danger on the south-western side of the channel.

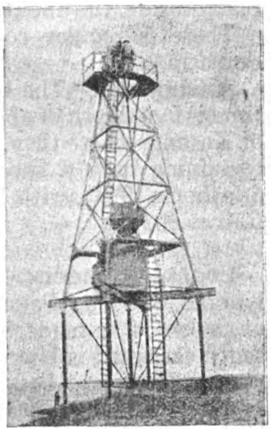
About 6½ miles southward of Maha Vajirunhis are the Argo riffen, over which there is a least depth of 1¾ fathoms ($3^{m}2$); about midway between them and the one-fathom ($1^{m}8$) patch, mentioned above, is a patch which dries, and there are several other patches in this vicinity.

Noord Pylades, a reef which dries, lies close inside the 100-fathom ($182^{m}9$) line, about 8 miles south-south-westward of Lakota. Between it and Argo riffen there is a 1¼-fathom ($2^{m}3$) patch.

Zuid Pylades, 10 miles southward of Lakota, is a reef which dries; it is the southernmost danger in this vicinity.

For dangers farther south-eastward, *see* page 287.

A light (*Lat. 1° 41′ N., Long. 98° 01′ E.*) is exhibited, at an elevation of 47 feet ($14^{m}3$), from a black iron framework structure on piles on Zuid Pylades.



Zuid Pylades' light-structure.
(*Original dated* 1913.)

Chart 3851, plan of Tapus road.

Reede Tapoes.—Danger.—Reede Tapoes (Tapus) is situated at the western end of the bight entered between Ujong Silabi and Ujong Karang or Kapala, both low points about 5 miles east-south-eastward. Ujong Tapoes (Tapus), from which a reef extends 1½ cables, lies about 1¾ miles eastward of Ujong Silabi. About three-quarters of a mile north-westward of Ujong Tapoes is Kuala Tapoes (Tapus).

Good landing may be effected on the western side of the bight northward of the reef fringing Ujong Silabi.

Ujong Binoeang (Binuang), over which there is a depth of 3 feet ($0^{m}9$), lies about three-quarters of a mile south-westward of Ujong Tapoes; it is marked by discolouration and sometimes by breakers.

Anchorage may be obtained, in a depth of about 4 fathoms ($7^{m}3$), mud, north-eastward of Ujong Silabi.

Chart 3851, plan of Barus road.

Reede Baroes.—Light.—Dangers.—Reede Baroes (Barus) is situated off the mouth of Sungei Pasar Terandam, 2¼ miles east-north-eastward of Ujong Karang. This point is the termination of a peninsula which forms the western side of the road, and is fringed by a reef, which dries, extending from one to 2 cables offshore.

Karang, a low wooded islet, fringed by a reef, lies 1½ miles southward of Ujong Karang; there is a small sandy beach on its eastern side. A shoal, with a depth of 2 fathoms ($3^{m}7$), lies 2 cables south-westward of its south-western point, and Siwa, a reef which dries, and sometimes

Charts 2760, 748b.

L

Chart 3851, plan of Barus road.

marked by breakers, lies about 2½ cables westward of its north-western point.

A narrow reef, which dries, and on which there are some rocks above water, extends nearly one mile south-south-westward from the south-eastern entrance point of Sungei Pasar Terandam.

A light is occasionally exhibited from a flagstaff near the Custom house, 4 cables eastward of the south-eastern entrance point of the river.

The limits of the roadstead are imaginary lines joining Ujong Karang and the western extremity of Karang and drawn in a 056° direction from the eastern extremity of that island.

Baroes (Barus), on the eastern side of the entrance to the river, is the residence of an Administrator. It is an unimportant place with a population consisting chiefly of Chinese traders. There is a landing place inside the mouth of the river.

There is regular communication by steamer with other ports in Sumatra.

Anchorage.—The best berth for vessels intending to remain some time is in a depth of about 9 fathoms ($16^{\text{m}}5$), about half a mile eastward of Karang, where they will be sheltered from westerly squalls. Vessels remaining only a short time may obtain anchorage, in a depth of 5 fathoms ($9^{\text{m}}1$), with Ujong Karang bearing 293°, and the flagstaff at Baroes, 017°.

Chart 2778.

Coast.—Dangers.—About 9½ miles south-eastward of Ujong Karang is Ujong Pane, from which a reef, with an islet of the same name on it, extends half a mile south-westward. One mile farther south-eastward is Ujong Raso, from which a reef, on which is an islet, named Bilalang (*Lat. 1° 55′ N., Long. 98° 30′ E.*), extends about 1½ miles south-westward. About 1¼ miles farther south-eastward is Ujong Si Alang Alang, from which a reef, with Karang Gienjang, which breaks, on its outer end, extends about 1¼ miles south-westward. Between Ujong Si Alang Alang and Ujong Karang, about 17 miles south-eastward, two rivulets discharge, Air Siboendong (Sibundong) and Air Kolang, 3 and 6 miles, respectively, south-eastward of Ujong Si Alang Alang.

Chart 3851, plan of Tapanuli bay and Pulo Mansalar.

Sorkam, a low islet covered with vegetation, and fringed by a steep-to reef, which extends about 3 cables south-westward from its south-western side, and on which the sea breaks heavily, lies about 1¾ miles south-westward of Kuala Sorkam, the mouth of Air Siboendong.

Good anchorage may be obtained eastward of Sorkam, over mud and sand.

Karang Gedang, which dries, lies about 5 miles south-eastward of Sorkam and one mile offshore. About three-quarters of a mile northward of it is a reef lying inside the 3-fathom ($5^{\text{m}}5$) line.

Banda, a reef with a depth of 6 fathoms ($11^{\text{m}}0$), and steep-to, lies 4¾ miles west-south-westward of Ujong Pandan, situated 4 miles north-westward of Ujong Karang. A 3¾-fathom ($6^{\text{m}}9$) patch, and a reef, with a depth of one foot ($0^{\text{m}}3$), lie 3½ miles west-north-westward, and three-quarters of a mile west-south-westward, respectively, of Ujong Pandan.

For Baai van Tapanoeli, *see* page 289.

Charts 2760, 748b.

Chart 2778.

PULAU NIAS NORTH CHANNEL.—Pulau Nias North channel, separating the Banjak eilanden from the northern end of Nias, is a deep passage about 30 miles wide, and except for the reef extending south-eastward from Sarang Aloe, described on page 276, is clear of dangers.

Babi and Lassia eilanden, on the northern side of the channel, westward of Banjak eilanden, and Banjak eilanden have been described on page 273.

Nias.—Aspect.—Nias, the largest of the islands off the west coast of Sumatra, is hilly, and from eastward has the appearance of a chain of mountains varying little in elevation. Maziaja, 1,417 feet (431^{m}9) high, 10 miles from the northern extremity, is the most conspicuous peak, which looks like a coffin, but the highest is the slightly cone-shaped Lelematsjoea (Lelematshua) or Onomojo (chart 2779), with an elevation of 2,907 feet (886^{m}0), lying 24 miles from the southern extremity, with other mountains of a nearly similar elevation in the vicinity. From westward, the hills along the coast are seen to better advantage, and afford good landmarks in conjunction with the islands fronting the coast. From southward the headlands provide the best marks. *See* also on page 291.

Southern side of Pulau Nias North channel.—Coast.—Light.—Dangers.—The northern coast of Nias, which forms the southern side of Pulau Nias North channel, is low, but there is a range of hills extending from Tanjong Si Gini Gini, the northern extremity of the island, to Maziaja. About one mile northward of Maziaja are three peaks, from 1,119 to 1,316 feet (341^{m}1 to 401^{m}1) high, and about 2 miles westward of these is Simalaj, 663 feet (202^{m}1) high, which is only visible from northward. *See* view facing page 288.

Tanjong Tojolawa (Toyolawa) (*Lat. 1° 25′ N., Long. 97° 03′ N.*), the north-western extremity of Nias, is steep-to. About 1¼ miles north-north-eastward is Tanjong Linga, and thence to Tanjong Tanah Nasi, 4¼ miles eastward, the coast is fringed by a reef; between Tanjong Linga and Tanjong Finago, about 1¼ miles eastward, rocks above water and some which dry extend out to the 10-fathom (18^{m}3) line. Gori Gori consist of two reefs, with a least depth of 11 feet (3^{m}4), lying with its shoalest part about 1¼ miles east-north-eastward of Tanjong Finago and half a mile offshore.

Chart 3853, plan of Tanjong Tanah Nasi to Sungi Muzöy.

Goso Tanah Nasi, over which there is a depth of one foot (0^{m}3), and which always shows by discolouration and generally by breakers, lies about 3½ cables northward of Tanjong Tanah Nasi.

The coast between Tanjong Tanah Nasi and Tanjong Toeho (Tuho), about 1¾ miles east-south-eastward, is low and swampy, and fringed with reefs and drying rocks, which extend out to the 10-fathom (18^{m}3) line. Si Ide Ide, an overgrown sand cay, lies on this foul ground, about a quarter of a mile eastward of Tanjong Tanah Nasi.

Goso Baohi, an island covered with scrub, is separated at its south-western end from Tanjong Toeho by a passage 2 cables wide, deep in mid-channel, but there is a reef which dries on the eastern side of the channel eastward of Tanjong Toeho. About 3 cables south-eastward of the southern extremity of Goso Baohi is Goso Lahewa, an islet lying near the outer end of a bank extending from that point. A 2½-fathom (4^{m}6) patch lies about 3 cables northward of Goso Lahewa.

Charts 2760, 748b.

Chart 3853, plan of Tanjong Tanah Nasi to Sungi Muzöy.

A light is exhibited, at an elevation of 67 feet ($20^{m}4$), from a white iron framework structure, at the northern extremity of Goso Baohi.

Baai van Simanari lies at the head of a bight entered between Tanjong Toeho and Tanjong Goö, about 2 miles east-south-eastward. Its entrance, which is 1½ cables wide, lies on the eastern side of Toere Djawi Djawi (Ture Jawi Jawi), a point about 1¼ miles south-south-eastward of Tanjong Toeho. Inside the entrance the bay divides into three arms, the western of which affords good shelter in all winds for small craft.

The western shore of the bay is covered with coconut palms, amongst which are two noticeable trees; the eastern shore is bordered with mangrove.

Simanari village, which is the headquarters of an Administrator, stands at the head of the western arm, and Lahewa village at the head of the south-eastern arm. The inhabitants are mostly Malay and Chinese traders. There is a wooden pier off Simanari village.

There is regular communication by steamer with other ports in Sumatra.

Between Tanjong Goö and the mouth of Moezeuj (Muzöy) rivier, 6¼ miles east-north-eastward, several rivulets discharge. Moawe village stands at the mouth of a rivulet, one mile south-eastward of Tanjong Goö, and from it a spit, with Gameoe (Gameu), an islet, on its outer end, extends 2 cables.

Off-lying islands and dangers.—Goso Oema (Uma) lies near the middle of an extensive reef, on which are several patches which dry, and which extends from about 1½ to 3½ miles north-eastward of the northern extremity of Goso Baohi (*Lat. 1° 26′ N., Long. 97° 10′ E.*).

Senaoe (Senaü), the largest of the group, lies about 1¾ miles eastward of Goso Oema, and Makora, half a mile southward of its southern extremity; these two islands are low and wooded; the others, with the exception of Lafoe (Lafau), about one mile south-south-westward of Makora, are low and overgrown with scrub. Within about one mile north-north-westward of Senaoe are three reefs, with depths of from 3 feet to 2½ fathoms ($0^{m}9$ to $4^{m}6$), and about 3 cables from its southern side, near its eastern end, is Alifa, an islet, with a 3-foot ($0^{m}9$) patch between.

Lafaoe, on which there is a hillock, has a village on its southern side. About 2 cables north-eastward of the island is Ardjoeno (Arjuno), a reef with a depth of 3 feet ($0^{m}9$), marked by discolouration, and occasionally by breakers. Gite, an island fringed by a reef, except on its north-western side, lies 1½ cables south-eastward of Lafaoe, and Mao is an islet lying about 1½ cables farther south-eastward and about one cable from the northern coast of Nias.

Taliwaä, an island, lies 8½ cables north-eastward of Gite. A patch, which dries, lies 4 cables south-south-eastward of Taliwaä, and Goso Ene lies three-quarters of a mile eastward. Kao, an islet, fringed by a narrow reef, lies about half a mile south-eastward of Goso Ene, and a quarter of a mile from the coast of Nias.

Anchorages.—Directions.—Anchorage may be obtained, in a depth of about 20 fathoms ($36^{m}6$), westward of Alifa, and in a depth of about 25 fathoms ($45^{m}7$), southward of Lafaoe.

Vessels approaching Baai van Simanari from westward may pass

Charts 2778, 2760, 748b.

Chart 3853, plan of Tanjong Tanah Nasi to Sungi Muzöy.

through the channel between Goso Baohi and Tanjong Toeho, as the reefs on either side show well by discolouration.

Approaching from north-eastward, vessels should pass between Senaoe and Makora, thence steer for Goso Lahewa, bearing 240°, and pass south-eastward of it, and thence to the entrance to the bay.

Moezeuj rivier.—The entrance to Moezeuj rivier is difficult to distinguish from a distance, but close in the village of Moezeuj (Muzöy) Ilir, with its coconut palms, will be seen on the left bank at the entrance. A bank of mud and sand, with depths of less than 3 fathoms ($5^{m}5$), which is very steep-to, extends about half a mile offshore from either side of the entrance, and banks, which dry, extend from about one to 1½ cables offshore from either side.

Small craft can enter at high water with an offshore wind, and ascend as far as the Sungei Ehaoe. Boats should approach the entrance on a south-easterly course.

Chart 2778.

Coast.—About 3 miles north-eastward of the entrance to Moezeuj rivier is Tanjong Helacha, which may be identified by its casuarina trees. About 3 miles northward of it is Tanjong Laoja (Laoya), one mile southward of which, and about 4 cables offshore, is a 3-fathom ($5^{m}5$) patch. Between Tanjong Laoja and Tanjong Si Gini Gini, a bank with depths of less than 10 fathoms ($18^{m}3$), on which the sea constantly breaks, extends half a mile offshore.

Between Sifahandro village, about 2¼ miles north-eastward of Tanjong Helacha (*Lat. 1° 28′ N., Long. 97° 20′ E.*), and Tanjong Laoja, and thence to Tanjong Si Gini Gini, which is low and densely wooded, there is a continuous grove of coconut palms.

For description of Baai van Siaba and coast south-eastward, *see* page 297.

Anchorages.—Vessels are recommended, when anchoring off the northern coast of Nias to do so as far offshore as possible to avoid the swarms of mosquitoes that come off at night with the land breeze; malaria is very prevalent.

Anchorage may be obtained during the North-east monsoon, in a depth of about 9 fathoms ($16^{m}5$), off Tanjong Helacha. During the South-west monsoon, the anchorages off this coast, as far westward as Senaoe, are untenable on account of the heavy seas.

Outlying island.—Sarangbaoeng, a low island covered with coconut palms, lies 10½ miles north-north-eastward of Tanjong Si Gini Gini; it is fringed by a reef, through which there is an opening on the south-eastern side available for boats leading to the village.

Anchorage may be obtained off the village, in a depth of about 27 fathoms ($49^{m}4$), sand, sheltered from north-westerly squalls.

Tidal streams.—The tidal streams in the vicinity of Sarangbaoeng set south-south-west and north-north-east at a rate of from a quarter of a knot to 1¼ knots, but they only set in the latter direction for a few hours during each day.

APPROACHES TO BAAI VAN TAPANOELI.—Dangers.—Bintanah, about 15 miles south-south-eastward of Zuid Pylades light-structure (page 283), is a low islet fringed by a reef, and should be given a good berth. About 2 miles north-westward of it is a 2¼-fathom

Charts 2760, 748b.

Chart 2778.

($4^{m}1$) patch, with a 4-fathom ($7^{m}3$) patch between, and about 1¾ miles farther north-westward is a reef, which dries, and on which the sea breaks heavily.

About 8 miles north-north-eastward of Bintanah is a 2¼-fathom ($4^{m}1$) patch; this is the northernmost danger on the southern side of the channel leading to Baai van Tapanoeli from seaward. About 2¾ miles south-eastward of this danger is a 2-fathom ($3^{m}7$) patch, and 2¼ miles farther is a reef with a depth of 3 feet ($0^{m}9$). About midway between this reef and Bintanah is a 5-fathom ($9^{m}1$) patch.

An islet, covered with coconut palms, lies about 5½ miles eastward of Bintanah, with a 2½-fathom ($4^{m}6$) patch between them, and a one-fathom ($1^{m}8$) patch lies about 2¾ miles farther eastward.

There are several dangers lying between Bintanah and Karang Kima, 11½ miles south-eastward, the positions of which may be seen on the chart. Karang Kima and numerous other dangers inside the 100-fathom ($182^{m}9$) line, extending 35 miles southward, are described on page 301.

As other rocks may exist in the vicinity, vessels passing eastward of Bintanah should keep close over to Mansalar, which is steep-to, and to the mainland southward of it. If passing westward of Bintanah, they should keep towards the coast of Nias to avoid the central reefs, which extend southward to about lat. 0° 47′ N.

Chart 3851, plan of Tapanuli bay and Pulo Mansalar.

Makasser, a reef which dries and is steep-to, lies 13½ miles eastward of Bintanah.

Mansalar.—Mansalar is an island lying in the western approach to Baai van Tapanoeli. At its north-western end is Hoenik (Hunik), a conical mountain, 1,480 feet ($451^{m}1$) high, with a conspicuous tree on its summit. Near the south-western point of the island is Pintjalang (Pinchalang), 1,673 feet ($509^{m}9$) high, and at the south-eastern end, Maligi, 1,243 feet ($378^{m}9$) high. Handang (*Lat. 1° 39′ N., Long. 98° 33′ E.*), a conical-shaped mountain, 4¼ miles north-westward of Ujong Saroba, the south-eastern extremity of the island, is 1,345 feet ($410^{m}0$) high. *See* view facing this page.

Tanah Ronto baai is the largest bight on the northern side of the island; it nearly divides the island into two portions, the isthmus at its head being a low ridge about 4 cables across. The shore of the bay is fringed by a reef which extends about 2½ cables westward from Ujong Batoe Pandjang (Batu Panjang), the eastern entrance point, 5½ miles north-westward of Ujong Saroba. A reef, with a depth of 3 feet ($0^{m}9$), lies about half a mile westward of Ujong Batoe Pandjang. A reef, on which lies an islet, named Tjambe (Chambe), extends 6 cables northward from the middle of the southern side of the bay.

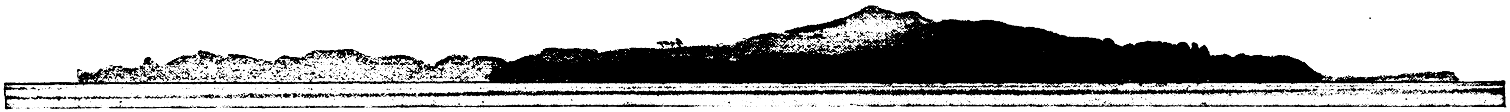
There is a noticeable waterfall at the north-western end of the island issuing from a hill at an elevation of 180 feet ($54^{m}9$); it is a good mark when approaching from north-westward.

A rock, with a depth of 2¾ fathoms ($5^{m}0$), lies about 3 cables north-westward of the north-western extremity of the island.

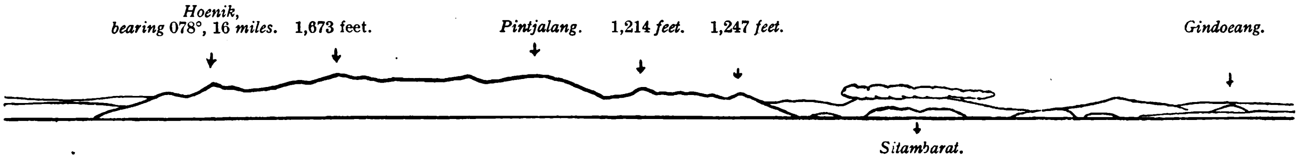
Mansalar baai, at the south-eastern end of Mansalar, is sheltered by Sitambarat, an island, 656 feet ($200^{m}0$) high, on the west, and affords a safe anchorage; southward of this island are Laboe Laboe (Labu Labu) gedang, Laboe Laboe (Labu Labu) kechil and Tarika, an islet joined by a reef to the western side of the latter island. South-

Charts 2760, 748b.

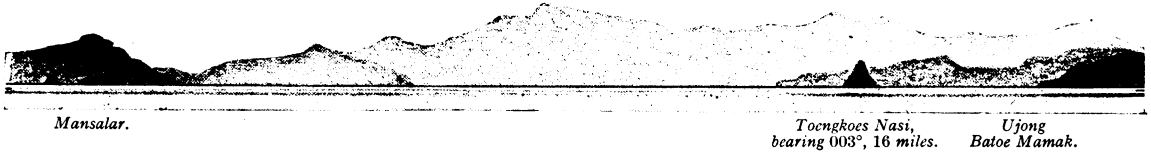
To face page 288.


Maziaja,
Tanjong Laäja, bearing 135°.
Tanjong Si Gini Gini, bearing 225°, 4 miles.
Tanjong Tanah Nasi.

Nias, north coast.
(Original dated 1902.)


Hoenik, bearing 078°, 16 miles.
1,673 feet.
Pintjalang.
1,214 feet.
1,247 feet.
Gindoeang.
Silambarat.

Western approach to Baai Van Tapanoeli.
(Original dated 1921.)


Mansalar.
Toengkoes Nasi, bearing 003°, 16 miles.
Ujong Batoe Mamak.

Southern approach to Baai Van Tapanoeli.
(Original dated 1902.)

Chart 3851, plan of Tapanuli bay and Pulo Mansalar.

ward of Laboe Laboe gedang and connected to it by a reef, is Kalimantang kechil, and 2¼ miles westward is Kalimantang gedang. All of these islands are steep-to.

Talam, an islet fringed by a reef, lies at the head of Mansalar baai, with a sunken rock lying off its north-western side.

Poeti (Puti) and Djonggi (Jonggi) are two islets lying from 2½ to 3 cables off the eastern side of Mansalar.

Chart 3851, plans of Northern part of Tapanuli bay, and of Tapanuli bay and Pulo Mansalar.

BAAI VAN TAPANOELI.—Dangers.—Baai van Tapanoeli (Tapanuli), entered between Ujong Karang and Ujong Batoe Mamak, about 9 miles southward, is the most sheltered and secure anchorage on the west coast of Sumatra, northward of Emma haven. (*See* views facing page 288.) The shores alternate between cliffs and mangrove swamps, and there are a few beaches.

Ujong Batoe Mamak is high, and about one mile southward of it is Batu Miting, 896 feet ($273^{m}1$) high; Toengkoes (Tungkus) Nasi, 590 feet ($179^{m}8$) high, is a conspicuous conical-shaped islet, lying about 1¾ miles north-westward of Ujong Batoe Mamak. The northern and western sides of the islet are clear of danger, but the other sides are fringed by a reef, and on the south-eastern side is a steep-to rock above water. There is a small sandy beach on the western side.

Bakal, about 4 cables northward of Ujong Batoe Mamak, is a densely wooded rocky islet with a reef extending from its western and southern sides. There is a good landing on the eastern side.

Oenggas (Unggas), about 2¼ miles eastward of Bakal, is a low islet covered with coconut palms and fringed by reef; a bank of sand and coral extends about 6 cables from its eastern side.

Kaboen (Kabun), 1,050 feet ($320^{m}0$) high, lies 5½ miles east-north-eastward of Ujong Batoe Mamak.

Several rivulets discharge into the bay, but it is generally difficult to enter them on account of the surf. Air Loboe (Lobu) discharges into an inlet on the south-eastern side of the bay, about 4½ miles eastward of Ujong Batoe Mamak. In the middle of this inlet there are depths of from 8 to 12 fathoms ($14^{m}6$ to $21^{m}9$), mud.

Djaga Djaga (Jaga Jaga) village (*Lat. 1° 36′ N., Long. 98° 49′ E.*) is situated on the eastern shore of the bay, about 1¼ miles east-north-eastward of Kaboen; Halangan, another unimportant village, stands about 3½ miles northward of Djaga Djaga, on the northern side of the entrance to Air Halangan.

Batu Boeroek (Buruk), 262 feet ($79^{m}9$) high, lies about 7 cables north-eastward of Ujong Karang. About 3½ miles eastward of the same point is Ujong Gedang, which is steep-to, and 1¼ miles farther eastward is Tombak Rantjang (Ranchang), 1,404 feet ($427^{m}9$) high.

A rock, with a depth of 1½ fathoms ($2^{m}7$), lies 2 cables southward of Ujong Karang.

Karang Sibangon and Karang Sibongsoe, both of which dry, lie about 1¾ miles south-south-westward of Ujong Gedang, and a reef lies about 4 miles southward of the same point and about 2 miles from the eastern shore of the bay. There are other reefs closer inshore, the positions of which can best be seen on the chart. All these reefs are generally marked by breakers.

Charts 2778, 2760, 748b.

Chart 3851, plan of Northern part of Tapanuli bay.

Pontjan (Ponchan) gedang, 377 feet (114^{m}9) high, and fringed by a reef, lies about 2¼ miles eastward of Ujong Karang; Bangke islet lies on the reef extending from the northern side of the island. Two detached reefs, on which the sea breaks at times, lie close off the eastern side of the island.

Pontjan (Ponchan) kechil, low and covered with coconut palms, lies one mile north-north-westward of Pontjan gedang; it is fringed by a reef which extends about 2 cables from its north-western side.

Saroedoet (Sarudut), an island, fringed by a reef, lies close off the eastern shore, about one mile north-eastward of Pontjan gedang.

Pandjang, an island 157 feet (47^{m}8) high at its southern end, lies 8 cables northward of Pontjan kechil. It is fringed by a reef, which, at the northern end, is nearly connected to the main island.

Submarine cables.—Submarine cables are landed at Sibolga and at a point about 1½ miles northward, the tracks of which can best be seen on the chart. Vessels must not anchor within 55 yards (50^{m}3) of them.

Anchorage.—Directions.—The usual anchorage is eastward of Pontjan kechil, in depths of from 6 to 7 fathoms (11^{m}0 to 12^{m}8), mud.

Charts 3851, plan of Tapanuli bay and Pulo Mansalar, 2778.

On approaching Baai van Tapanoeli, the highest peaks of the coastal range southward of the bay, as well as the summit of the mountains backing the bay, may be easily identified from some distance. The northern approach between Mansalar and the Sumatra coast is clear of danger except for Banda, described on page 284, and the southern approach between Laboe Laboe kechil and Toengkoes Nasi (*Lat. 1° 35′ N., Long. 98° 41′ E.*), is clear of danger.

Chart 3851, plan of Sibolga road.

Reede Sibolga.—Light.—Reede Sibolga is a cove at the north-eastern end of Baai van Tapanoeli, about 2 cables wide, formed by the shore reef, which is marked on both sides by stake beacons.

Chart 3851, plan of Tapanuli bay.

The limits of the roadstead are imaginary lines from the point south-south-eastward of Batu Boeroek through the northern extremity of Pontjan kechil, and from the eastern extremity of that island to the north-eastern extremity of Pontjan gedang, and the parallel of latitude through the southern extremity of the latter island.

Chart 3851, plan of Sibolga road.

There is a small wooden pier at the southern end of the cove, equipped with a crane, with a lifting capacity of about 3 tons.

A light is exhibited, at an elevation of 18 feet (5^{m}5), from a white iron framework structure, 13 feet (4^{m}0) in height, on the head of the pier.

Anchorage may be obtained, in a depth of about 6 fathoms (11^{m}0), mud, with the head of the pier bearing 070°, and the north-eastern extremity of Saroedoet, 127°. Also, in a depth of about 5 fathoms (9^{m}1), about 2 cables from the head of the pier.

Sibolga.—Sibolga village is the residence of an Administrator. There is a stone jetty about half a mile southward of the village. There are two mooring piles close to the head of the jetty.

A few provisions may be obtained.

There is an infirmary with separate wards for infectious cases, and there is a resident medical officer.

There is regular communication by steamer with other ports in Sumatra.

Charts 2778, 2760, 748b.

Chart 3851, plan of Northern part of Tapanuli bay.

Head of Baai van Tapanoeli.—North-westward of Pandjang there is an extensive inlet, entered through a narrow channel, which affords shelter from all winds for several small craft with local knowledge, in a depth of about 3½ fathoms (6^m4), in the middle.

About 3 miles north-north-westward of Sibolga, at the head of the bay is Pargadoengan village, and about three-quarters of a mile farther is Tapanoeli village.

Charts 2778, 2779.

NIAS.—The coasts of Nias are either rocky or bordered by sandy beaches, and the island is densely wooded, the coconut plantations on the southern and eastern coasts being several miles in length. Most of the villages are situated on the hill-tops, and are connected by good roads, especially in the southern part of the island. The inhabitants are peaceful, and are forbidden to carry arms. The southern and central parts of the island are densely populated, but thinly in the north. There is valuable timber in the island.

Malay and Chinese traders inhabit the coast. The Nias language is spoken in different dialects all over the island. Malay only, however, is used at Goenoeng (Gunong) Sitoli (*Lat. 1° 17′ N., Long. 97° 37′ E.*), the principal town. *See* also on page 298.

There are numerous rivulets, but they are of little use to shipping; the largest is the Moezeuj (*see* page 287); the Ojo (Oyo), which discharges about midway along the west coast, is navigable by sampans for a considerable distance, but the entrance is very shallow.

The south-westerly ocean swell breaks heavily on the south and south-east coasts as far up as Ujong Sjoeani on the east coast. During the westerly monsoon landing is very dangerous on the open coast even in calms after days of fair weather, as the ocean swell, although exhausted, still breaks with great force against the deep beaches. Fair weather is generally found on the west coast from December to April, but moderate surf on the beaches continues even when the sea is quite calm.

Tidal streams.—Current.—The tidal streams around the island are weak, seldom exceeding a rate of three-quarters of a knot, which is mostly due to the prevailing wind.

On the western side, from Tanjong Tojolawa (page 285), to abreast the north-western extremity of Merapi, a reef, 18½ miles south-south-eastward, the current sets north-north-westward, at a maximum rate of three-quarters of a knot, thence to the southern end of the island there is a weak south-south-easterly set, not exceeding half a knot.

In the vicinity of Hinako eilanden, off about the middle of the west coast of Nias, there is no current.

Between Nias and the Batoe (Batu) eilanden, south-eastward of it, there is a constant but weak south-south-easterly current.

WESTERN SIDE OF NIAS.—Coast.—Nearly the whole of the west coast is inaccessible on account of the surf.

Chart 2778.

Tanjong Sosilutte, 1¾ miles south-eastward of Tanjong Tojolawa, is a low point with a noticeable tree on it, and it is the southern extremity of Tojolawa peninsula, on the slopes of which are the buildings of a coconut plantation.

Charts 2760, 748b.

Chart 2778.

Laboean Atjeh (Labuan Acheh) is a bay on the eastern side of Tojolawa peninsula, which affords sheltered anchorage during northerly winds, in depths of from 10 to 12 fathoms ($18^{m}3$ to $21^{m}9$), sand. A 3-fathom ($5^{m}5$) patch lies on the eastern side of the bay, about 3½ cables offshore.

Charts 2778, 2779.

Maoesi (Mausi), a low, barren island, lies in the southern approach to Laboean Atjeh, about 2¼ miles south-eastward of Tanjong Sosilutte. It has a white sandy beach and is fringed by a reef on which the sea always breaks, extending about three-quarters of a mile southward, with a depth of 4½ fathoms ($8^{m}2$) at its outer end.

Anchorage may be obtained, in a depth of about 19 fathoms ($34^{m}7$), sand and mud, off the eastern side of Maoesi, sheltered partially from the heavy swell.

Tanjong Bebetaloe, about 9 miles south-eastward of Tanjong Sosilutte, is high and rugged ; Tanjong Mbana, about 1¾ miles farther south-south-eastward, is low and overgrown.

Off-lying island and dangers.—An extensive reef, with a depth of 4½ fathoms ($8^{m}2$), and marked by discolouration, lies 3½ miles southward of Maoesi, and 5½ miles offshore.

Woenga (Wunga), a low island covered with coconut palms, lies on the reef of an atoll, about 7 miles south-westward of Tanjong Mbana ; there is a noticeable tree near its north-eastern extremity. The entrance to the lagoon is encumbered with rocks which dry, and only small craft with local knowledge should attempt to enter. There are a few inhabitants on the island.

Anchorage may be obtained eastward of the noticeable tree, about 2 cables offshore, in a depth of about 13 fathoms ($23^{m}8$), sheltered from westerly winds and the heavy swell, or with the southern edge of the wood at the entrance to the lagoon bearing about 213°, in depths of from 11 to 16 fathoms ($20^{m}1$ to $29^{m}3$).

Merapi, a reef, over which there is a least depth of 5 fathoms ($9^{m}1$), lies about 6½ miles south-eastward of Woenga, and is nearly always marked by a swell but not by discolouration.

Chart 3853, plan of Afulu bay.

Baai van Afoeloe.—Baie van Afoeloe (Afulu), entered between the eastern extremity of Oema (Uma), an island situated 2 miles south-eastward of Tanjong Mbana (*Lat. 1° 16′ N., Long. 97° 12′ E.*), and Tanjong Gamaoehe (Gamauhe), a heavily overgrown point about 3½ cables eastward, affords a secure anchorage for small craft. The entrance points are fringed with reefs, which are marked by breakers, leaving a channel about 1¾ cables wide between them ; there is a 3½-fathom ($6^{m}4$) patch in the fairway in the approach.

Vessels should enter with a noticeable house with a zinc roof at the head of the bay bearing 011°, which leads midway between the reefs on either side of the entrance.

Afoeloe (Afulu) village is situated at the head of the bay.

Charts 2778, 2779.

Coast.—**Dangers.**—Tanjong Namehesa, 1½ miles south-south-eastward of Tanjong Gamaoehe, is noticeable ; the bight between them is mostly filled with reefs, and southward of the point the coastal reef extends about a quarter of a mile offshore. Tanjong Seboea (Sebua), about 4½ miles south-eastward of Tanjong Namehesa, is the

Charts 2778, 2779.

most conspicuous of the points south-eastward of Afoeloe ; it is thickly wooded, and the hills come closely to it. There is a landing for boats in a small cove on the eastern side of the point. Just south-eastward of this cove the jungle growth gives place to casuarinas over a small stretch of coast, which occurs again northward of Tanjong Siromboe, about 15 miles south-south-eastward of Tanjong Seboea.

An extensive reef, which dries, extends about 6 cables southward of Tanjong Seboea.

Chart 2779.

The coast between Tanjong Seboea and Tanjong Siromboe is fronted by several dangers, with depths of from 1¼ to 3¼ fathoms (2^{m}3 to 5^{m}9), which lie from about one to 2½ miles offshore. A 3¼-fathom (5^{m}9) patch lies about 3 miles westward of the latter point. Vessels should not approach within 4 miles of the coast.

Chart 3853, plan of Hinako islands.

Reede Siromboe.—Dangers.—Anchorage.—Tanjong Siromboe is a low wooded point, which may be identified by several tall casuarina trees which stand up above the other trees. From a distance it resembles an islet, but closer in the low wooded sandy isthmus joining it to the land is visible. From both northward and southward of the point the broad flat-topped mountain Sommumme (chart 2779), 1,926 feet (587^{m}0) high, about 11½ miles north-eastward of it, is visible.

The roadstead is situated off Siromboe village, which stands on the eastern side of the isthmus, about half a mile northward of Tanjong Siromboe. Sungei Baeula (Baöla) discharges into the northern side of the roadstead nearly one mile eastward of the village.

During the North-east monsoon, or with fine weather during the South-west monsoon, landing may be effected on the beach just northward of the coastal reef, or in an opening in the latter just inside Tanjong Siromboe.

One mile eastward of Tanjong Siromboe (*Lat. 0° 56′ N., Long. 97° 24′ E.*) is Siïte, a wooded island, with a conspicuous casuarina tree on its western side. A rock, above water, lies close off its southern side. About half a mile southward of Siïte is Lawandra, an islet covered with vegetation. Some rocks above water and others which dry, extend about half a cable from the north-eastern side of Lawandra.

A reef, with a least depth of 3 feet (0^{m}9), extends about 6 cables southward from the southern side of Lawandra.

Anchorage may be obtained in Reede Siromboe, in a depth of 6 fathoms (11^{m}0), eastward of the village, but vessels usually swing broadside on to the south-westerly swell and roll heavily. A better anchorage may be obtained north-eastward of Siïte, in a depth of 6 fathoms (11^{m}0), mud.

There is regular communication by steamer with other ports in Sumatra.

Hinako eilanden.—Lights.—Dangers.—Hinako eilanden form a group of 8 islands, namely, Asoe, Heroewanga, Imana, Hinako, Langoe, Bawa, Bugi and Hamoetala, lying from about 4 to 8 miles south-westward of Tanjong Siromboe ; they are of coral formation, covered with coconut palms, and are all flat, with the exception of Hinako or Nako, which has a hillock on its north-western side ; this island is the most densely populated, and has a mission and school ; the inhabitants are mostly Malays and Chinese.

Charts 2760, 748b.

Chart 3853, plan of Hinako islands.

There is regular communication by steamer with ports in Sumatra.

A light is exhibited, at an elevation of 178 feet (54^{m}2), from a white iron framework structure, 105 feet (32^{m}0) in height, on the north-western side of Hinako, and a light is occasionally shown from a post on the beach near the village, on the south-eastern side of the same island.

Bawa, the southernmost island of the group, is partially wooded on its sides.

The channel between Asoe (Asu), the north-westernmost of the group, and Heroewanga (Heruwanga), about 1½ miles southward, is clear of dangers.

A reef, with a depth of 5 feet (1^{m}5), lies about 3½ cables from the north-eastern side of Asoe.

The passages between Hinako and Imana and between Bugi and Hamoetala (Hamutala) are encumbered with reefs. Goso Buko, a reef with a depth of 8 feet (2^{m}4), lies about 3¼ cables from the north-western side of Imana, and a one-fathom (1^{m}8) patch lies 4 cables eastward of its eastern extremity.

About midway between Langoe (Langu), the north-easternmost island of the group, and the northern extremity of Bugi, about 8½ cables southward, is a reef which dries at its northern end, and about 2 cables north-westward of this point is a reef, on which there is a conspicuous black rock, which dries about 2 feet (0^{m}6). A 2½-fathom (4^{m}6) patch lies about 3½ cables northward of the north-eastern extremity of Bugi, and a reef with a depth of 3 feet (0^{m}9) over it, lies about 6½ cables north-eastward of the same point.

Gosong Pinang, an extensive reef, is situated at the south-eastern end of the Hinako eilanden ; it has a least depth of 2¾ fathoms (5^{m}0) on its western side, where the sea breaks heavily, situated about 2¾ miles eastward of Tanjong Obotokufa, the southern extremity of Bawa.

Anchorage.—Directions.—A fairly sheltered anchorage may be obtained, in a depth of about 19 fathoms (34^{m}7), mud and sand, off the south-eastern side of Hinako, with the southern extremity of the island bearing 259°, and the eastern extremity, 025°.

Vessels approaching from south-eastward between Bugi and Bawa, should steer for the westernmost house of Hinako village, which has a zinc roof, and is high and conspicuous.

Vessels passing westward of the islands should keep outside the 100-fathom (182^{m}9) line.

Chart 2779.

Coast.—The west coast of Nias southward of Tanjong Siromboe (*Lat. 0° 56′ N., Long. 97° 24′ E.*) is high with some noticeable headlands, which, however, are obscured during the early hours of the morning by mist from the spray caused by the surf. Landing is impossible during the greater part of the year.

Aspect.—The hill country behind and near the coast provides better landmarks than elsewhere in the island. Silealo, 1,362 feet (415^{m}1) high, situated 8¾ miles east-north-eastward of Tanjong Siromboe, and Salawaähi, 1,555 feet (474^{m}0) high, 1½ miles south-south-eastward of Silealo, are both cone-shaped. Dao Dao, about 7 miles south-eastward of Salawaähi, is 2,192 feet (668^{m}1) high, and from westward appears pointed. Bawedesulle, 6 miles southward of

Charts 2760, 748b.

Chart 2779.

Dao Dao, and about half a mile from the coast, is 1,240 feet ($378^{m}0$) high; it has a lower peak on its southern slope, so that it appears as a hump-backed ridge from westward or southward. Several bright green fields, alternating with the otherwise dark vegetation, lie just southward of this mountain. Sarahili, nearly one mile within the coast and 5 miles south-south-eastward of Bawedesulle, is 669 feet ($203^{m}9$) high, pointed and easy to identify, as it lies between two high headlands, Tanjong Taro Odsjio and Tanjong Tetegalachaoe. *See* view facing page 296.

There are two noticeable landmarks farther southward:—the village of Bawefalagetane standing at an elevation of 571 feet ($174^{m}0$), situated 5 miles south-south-eastward of Sarahili, is visible between the coconut palms; and two large trees, standing at an elevation of 1,175 feet ($358^{m}1$), about 3 miles east-north-eastward of the village, are visible a great distance.

Coast.—In many places, especially off the projecting rugged headlands, large black rocks above water lie close inshore. About 10 miles south-eastward of Tanjong Siromboe is Tanjong Nitawisoli, a low point, about one mile west-south-westward of which is Faroa, a wooded islet, 249 feet ($75^{m}9$) high. Rii, a rock, 207 feet ($63^{m}1$) high, covered with vegetation, and connected to the coast by a reef, which dries, lies about 1½ miles northward of Faroa. This islet and rock are the only ones on this stretch of coast with any vegetation.

About 4¼ miles south-eastward of Tanjong Nitawisoli is Tanjong Tedu Ichoe (Ichu), which appears as an islet for some distance. A reef, which dries, lies about 3½ cables south-westward of the point, and is usually marked by breakers. Molaai (Molai), a pointed rock, lies about 3½ cables south-westward of Tanjong Saetsjoe (Saetshu), situated about 2¼ miles south-eastward of Tanjong Tedu Ichoe. Hilihuroe, close north-eastward of Tanjong Tetegalachaoe, situated 7 miles southward of Tanjong Saetsjoe, is the only village on the coast southward of Siromboe. The mouth of the Eho, about three-quarters of a mile eastward of Tanjong Io Dawa, 5¼ miles southward of Tanjong Tetegalachaoe, is inaccessible on account of the surf.

Chart 3853, plan of Telok Lagundi.

Tanjong Laoejoe (Lauyu), (*Lat. 0° 34′ N., Long. 97° 42′ E.*), the south-western extremity of Nias, is low, but rises gradually to Saga Saga, 361 feet ($110^{m}0$) high.

SOUTHERN SIDE OF NIAS.—Lagoendi baai.—Dangers.—Lagoendi (Lagundi) baai, entered between Tanjong Laoejoe and Tanjong Ichoe (Ichu) Nene, about 1¾ miles eastward, affords anchorage, in depths of from 6 to 7 fathoms ($11^{m}0$ to $12^{m}8$). Its shores are covered with coconut palms, and there is a sandy beach at its head free from rocks, where landing may be effected; elsewhere the shores are fringed by a reef extending from one to 2½ cables offshore.

A reef, which dries, and is marked by breakers, lies half a mile west-south-westward of Tanjong Laoejoe, and a spit, with depths of less than 6 fathoms ($11^{m}0$), extends 6¾ cables south-eastward from the point.

Batu Mandi, a large black rock, lies 7 cables south-south-eastward of Tanjong Ichoe Nene, and 3 cables offshore, and is a good mark. Batu Ito is a rock covered with vegetation, lying on the coastal reef, 1¾ cables

Charts 2760, 748b.

Chart 3853, plan of Telok Lagundi.

southward of Tanjong Ichoe Nene ; about 4 cables south-westward of it is a rock, which dries.

Lagoendi (Lagundi) village is situated at the head of the bay, and on the hills on the western side is Hilibotodane village, the roofs of some of the houses of which can be seen from the bay. Lagoendi is principally inhabited by Malays and Chinese. The district is densely populated.

Anchorage.—Directions.—Anchorage may be obtained near the head of the bay, in a depth of about 6 fathoms ($11^{m}0$), with Batu Ito bearing 170°, and Tanjong Toere Traoehe (Ture Trauhe), situated about 1½ miles east-north-eastward of Tanjong Laoejoe, 218°. With southerly and south-westerly winds a fairly heavy swell sometimes sets into the bay.

A vessel approaching from westward should keep Batu Mandi bearing less than 090° until Amaitaniha village, on the high land on the eastern side of the bay, about 1¼ miles north-north-eastward of Tanjong Ichoe Nene, bears 043°, when she should steer for it on that bearing, and when Batu Ito bears 164°, alter course northward for the anchorage.

Chart 2779.

Coast.—Telok Fohili and Telok Gosi, the entrances to which lie about 1½ miles and 3½ miles, respectively, eastward of Batu Mandi, are shallow and inaccessible. Noedsja, an island on the eastern side of Telok Fohili, is covered with mangroves. Vessels should give this coast a berth of 2 miles, as there are 4- and 5-fathom ($7^{m}3$ and $9^{m}1$) patches lying about one mile offshore.

Chart 3853, plan of Telok Dalam.

Telok Dalam.—Lights.—Anchorage.—Telok Dalam, entered between Tanjong Hele, about 5 miles eastward of Batu Mandi, and Tanjong Batoe (Batu), 8½ cables north-eastward, affords good shelter from all except south-easterly winds, which, however, do not cause much swell, and is free from dangers.

Tanjong Hele is moderately high, and partly covered with coconut palms ; it is fringed by a reef, on which the sea breaks ; a spit with a least depth of 2¼ fathoms ($4^{m}1$), extends about three-quarters of a mile south-eastward from it. Tanjong Batoe is 315 feet ($96^{m}0$) high and falls nearly vertically into the sea. The shores of the bay, except for about 4 cables inside Tanjong Batoe (*Lat. 0° 33′ N., Long. 97° 50′ E.*), are fringed by a reef, which leaves only a narrow channel at the head. The hills are covered with groves of coconut palms. *See* view facing this page.

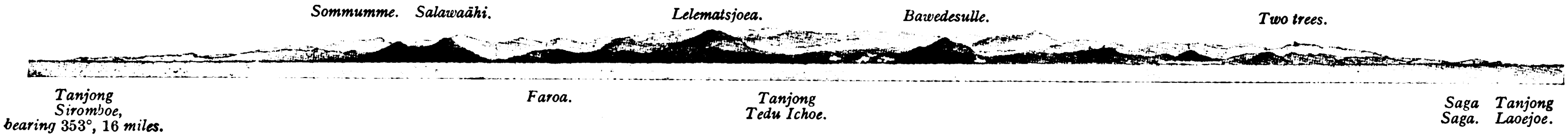
Two leading lights are situated at the head of the inlet ; the front light, on the head of the pier, is exhibited, at an elevation of 21 feet ($6^{m}4$), from a white iron structure surmounted by a triangle, point up, 16 feet ($4^{m}9$) in height ; the rear light is exhibited, at an elevation of 34 feet ($10^{m}4$), from a black and white iron structure, surmounted by a triangle, point down, 29 feet ($8^{m}8$) in height, at the head of the inlet. The lights in line, bearing 324°, lead into the inlet. These lights were reported, in 1946, to be extinguished.

Anchorage may be obtained, in a depth of about 10 fathoms ($18^{m}3$), sand and mud, with the pier-head bearing 327° and Tanjong Batoe, 096°. Small craft may anchor closer in, in a depth of not less than 6½ fathoms ($11^{m}9$).

Telok Dalam, a village at the head of the inlet, is the head-quarters of an Administrator.

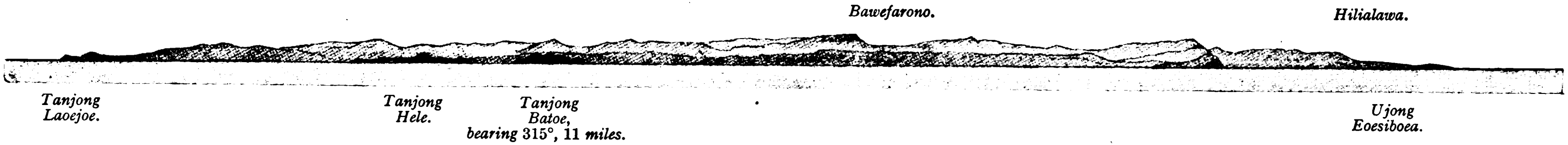
Charts 2760, 748b.

To face page 296.


Sommumme.
Salawaähi.
Lelematsjoea.
Bawedesulle.
Two trees.
Tanjong Siromboe, bearing 353°, 16 miles.
Faroa.
Tanjong Tedu Ichoe.
Saga Saga.
Tanjong Laoejoe.

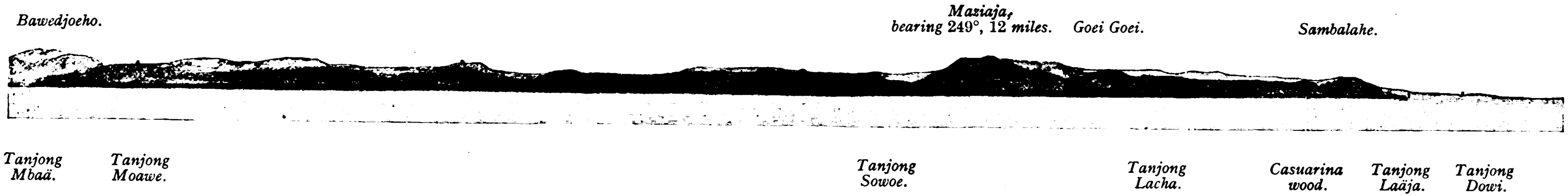
Nias, south-west coast.

(Original dated prior to 1916.)


Bawefarono.
Hilialawa.
Tanjong Laoejoe.
Tanjong Hele.
Tanjong Batoe, bearing 315°, 11 miles.
Ujong Eoesiboea.

Nias, south coast.

(Original dated prior to 1916.)


Bawedjoeho.
Maziaja, bearing 249°, 12 miles.
Goei Goei.
Sambalahe.
Tanjong Mbaä.
Tanjong Moawe.
Tanjong Sowoe.
Tanjong Lacha.
Casuarina wood.
Tanjong Laäja.
Tanjong Dowi.

Nias, north-east coast.

(Original dated prior to 1916.)

Chart 3853, plan of Telok Dalam.

There is a pier, with a depth of about 7 feet ($2^{m}1$) at its head, at the village.

There is regular communication by steamer with other ports in Sumatra.

For the coast north-eastward of Telok Dalam, *see* page 301.

Charts 2778, 2779.

EASTERN SIDE OF NIAS.—Coast.—The east coast of Nias has moderate depths with good anchorage; islets and reefs front the coast as on the western side, but the sea being smoother on the east coast renders it safer. *See* view facing page 296.

Current.—Tidal streams.—Between Tanjong Si Gini Gini (page 285) and Tanjong Sowoe (Sowu), about 13½ miles south-eastward, the current generally sets between north-west and north-north-west, at a maximum rate of 1½ knots. Between Tanjong Sowoe and Tanjong Laäja (Laäya), 5 miles north-westward, the tidal streams set along the coast.

Chart 3853, plan of Siaba bay.

Baai van Siaba.—Danger.—Baai van Siaba, the northernmost anchorage in Nias, is entered between Tanjong Toere Leusoe (Ture Lösu), about 1¾ miles south-eastward of Tanjong Si Gini Gini, and Tanjong Dowi, 2 miles eastward. There are two inlets on its western side, Telok Siaba and Telok Sawaoeloe (Sawaulu).

Tanjong Dowi, a low point covered with coconut palms, is fringed by a reef which dries, extending 1½ cables offshore; a spit, with a depth of 1¼ fathoms ($2^{m}3$) at its outer end, extends about 4 cables north-north-westward from the point.

Goso Baäh, on which there are some rocks which dry, lies about 4 cables south-eastward of Tanjong Toere Leusoe; it is marked by discolouration, and sometimes by breakers. Oenggi (Unggi), on the eastern side of the bay, about 9 cables south-south-westward of Tanjong Dowi, is an islet fringed by a reef. Sungei Sawe, the entrance to which may be identified by casuarina trees, discharges into the head of the bay; the shores elsewhere are densely wooded.

Anchorages.—Anchorage may be obtained, in a depth of about 22 fathoms ($40^{m}2$), eastward of Tanjong Sawaoeloe (*Lat. 1° 30′ N., Long. 97° 23′ E.*), which is covered with coconut palms, or south-eastward of Tanjong Toere Leusoe, between it and Goso Baäh. Vessels can lie here in smooth water during north-westerly and westerly winds when there is a heavy sea outside.

Chart 2778.

Coast.—Telok Fofola, entered between Tanjong Fino, 1¾ miles south-south-eastward of Tanjong Dowi, and Tanjong Laäja, is fringed by reef, and like the hills around, its shores are densely wooded. There are coconut plantations at the mouths of the Fino rivier, three-quarters of a mile southward of Tanjong Fino, and Fofola and Ladara rivieren, which discharge into the head of the bay, near villages of the same name.

Good anchorage may be obtained, in a depth of about 12 fathoms ($21^{m}9$), off Faroe (Faru) village, about 1¾ miles south-south-eastward of Tanjong Fino.

Tanjong Laäja is the northern termination of Sambalahe, a hill, 696 feet ($212^{m}1$) high; it is covered with coconut palms, steep-to,

Chart 2778.

and free from danger, but is difficult to identify. Between this point and Tanjong Tambalo, 8 miles south-eastward, the coast is fringed by reef, which extends, with depths of less than 3 fathoms ($5^{m}5$), from about 2 to 4 cables offshore, except north-eastward of Tanjong Lacha, situated 2¾ miles south-eastward of Tanjong Laäja, where it projects about 9 cables. At the outer end of this projection is Goso Pasir, a reef, which dries, and is marked by breakers. Tanjong Dowi, bearing about 300°, open of Tanjong Laäja, leads north-eastward of this reef.

Telok Beloekoe, entered between Tanjong Sowoe and Tanjong Tambalo, affords anchorage in a depth of 10 fathoms ($18^{m}3$), off Afia village, situated at the mouth of the rivulet of the same name, 2 miles southward of Tanjong Sowoe ; it can be identified by several coconut palms standing near its northern bank. Lake Sitafete, close northward of the village, although connected with the sea by a creek, is not accessible for boats. The shores of the bay are bordered by coconut palms, and on Tanjong Sowoe there is a wood of tall casuarina trees. Sungei Sowoe, which flows out at the point is fringed by a reef at its mouth.

The coast between Tanjong Tambalo and Tanjong Moawe, about 3½ miles south-eastward, is low and covered with coconut palms. Northward of Tanjong Tambalo, the coast is densely wooded to the water's edge. The coast between Tanjong Moawe and Tanjong Mbaä, 1¼ miles farther southward, is rocky, steep-to and backed by hills, from about 600 to 850 feet ($182^{m}9$ to $259^{m}1$) high. Tanjong Tambalo, Tanjong Moawe and Tanjong Mbaä are rocky and steep-to.

Chart 3853, plan of Gunong Sitoli road.

Reede Goenoeng Sitoli.—Lights.—Reede Goenoeng (Gunong) Sitoli, close southward of Tanjong Mbaä, is an indifferent anchorage on account of the steeply sloping bottom, and it is entirely open to winds between north and south-east, which cause a heavy sea. There is a pier, with a depth of about 22 feet ($6^{m}7$) at its head.

A light (*Lat. 1° 19′ N., Long. 97° 36′ E.*) is exhibited, at an elevation of 247 feet ($75^{m}3$), from a white iron framework structure, 69 feet ($21^{m}0$) in height, on Tanjong Mbaä.

A light is occasionally exhibited, at an elevation of 25 feet ($7^{m}6$), from a flagstaff at the root of the pier at Goenoeng Sitoli.

The limit of the roadstead is the arc of an imaginary circle with a radius of one mile and the flagstaff as centre.

Sungei Noh, which discharges on the south-eastern side of Tanjong Balei, 2¾ cables east-south-eastward of the pier, is always marked at its mouth by surf ; small craft can enter at high water.

Anchorage.—Anchorage may be obtained, in a depth of about 20 fathoms ($36^{m}6$), mud, with the barracks, which is a noticeable dark grey building, bearing 185°. Vessels in this berth will be about a quarter of a mile from the pier-head, and about one cable outside the 10-fathom ($18^{m}3$) line.

Goenoeng Sitoli.—Goenoeng Sitoli, the principal town of the island, is the headquarters of an Administrator. It stands mainly on the left bank of Sungei Noh, over which there is a bridge. It can be identified from some distance by the zinc roofs of the Chinese warehouses. The 604-foot ($184^{m}1$) hill westward of the town is easily identified.

There is regular communication by steamer with ports in Sumatra.

There is a resident medical officer.

Charts 2760, 748b.

Charts 2778, 2779.

Coast.—Between the mouth of Sungei Noh and Tanjong Lambaroe, about 13½ miles south-eastward, the coast is bordered in places by a sandy beach strewn with boulders. Sandbanks, which are very steep-to, extend a quarter of a mile offshore close northward of Tanjong Ndra, situated about 7 miles south-south-eastward of Tanjong Mbaä, also from the mouths of Gide Siide and Gide Seboea (Sebua), about 3¼ miles south-south-eastward and 5¼ miles south-eastward, respectively, of Tanjong Ndra ; the latter river discharges at Tanjong Gide Seboea (Sebua).

Between Tanjong Ndra and Tanjong Gide Seboea the hills approach the coast, leaving only a narrow strip of low land between, but they are difficult to identify ; the highest part, Naija, 896 feet (273^{m}1) high, lies close to the fairly steep southern slope of a long ridge. The points are mostly low and covered with trees, but Tanjong Fodo, 2½ miles north-westward of Tanjong Ndra, is moderately high, and with a good light shows its red and white cliffs. Off Tanjong Ndra, the church tower of Hoemene (Humene), about one mile southward, is visible on some bearings between the trees.

Anchorage may be obtained, in a depth of 11 fathoms (20^{m}1), off Foa village, about 2 miles southward of Tanjong Ndra, about 3 cables offshore ; the village is not visible, but the place can be identified by the large coconut grove in which it lies.

Tanjong Lambaroe is swampy and thickly overgrown ; dead trees stand on it and in the water close off it.

Vessels with local knowledge navigate along the coast between Tanjong Lambaroe and Telok Dalam (page 296), inshore of the islands and reefs, which lie in some places 7 miles from the coast.

Current.—A southerly current is experienced between Goenoeng Sitoli and the southern part of Nias, setting parallel with the coast, at a maximum rate of one knot.

Chart 3853, plan of Onolimbu road.

Reede Onolimboe.—Dangers.—Ujong Onolimboe lies about 8½ miles south-eastward of Tanjong Lambaroe, and in the bight formed close north-westward of the former point is Reede Onolimboe, which affords a secure anchorage with good holding ground.

At Ujong Onolimboe (*Lat. 1° 03′ N., Long. 97° 54′ E.*), the coconut palms which stand westward of it, are replaced by casuarina trees, and on the western side of the point Sungei Mola discharges.

Goso Sandroeta (Sandruta), which dries, lies 4¾ miles north-westward of Ujong Onolimboe and nearly one mile offshore. About 1¼ miles farther north-westward and 3¼ cables offshore is a one-fathom (1^{m}8) patch, and about 1¼ miles eastward is a 4-fathom (7^{m}3) patch. Goso Naäj (Naäy) and Goso Bodsjihona (Bodshihona), both of which dry, and are well marked by discolouration, lie about 3½ and 3 miles, respectively, north-north-westward of Ujong Onolimboe. Two rocks, marked by discolouration, and on which the sea breaks, one of which has a depth of 3 feet (0^{m}9) over it, and the other one foot (0^{m}3), lie, respectively, about 9 and 10½ cables east-south-eastward of Goso Bodsjihona.

Onolimboe, an islet, lies about one mile northward of Ujong Onolimboe, and Moesi (Musi), an islet with a noticeable tree on it, lies about 1¼ miles eastward of Onolimboe.

Anchorages.—Directions.—Anchorage may be obtained, in

Charts 2760, 748b.

Chart 3853, plan of Onolimbu road.

depths of from 12 to 14 fathoms ($21^{m}9$ to $25^{m}6$), mud, off Onolimboe village, 8 cables westward of Ujong Onolimboe. Also off Bodsjihona village, 4½ miles north-westward of the same point, in a depth of about 10 fathoms ($18^{m}3$), north-westward of the sandbank which extends off the mouth of Sungei Gawo.

In approaching the roadstead from north-westward, Ujong Onolimboe in line with Ujong Suma (chart 2779), bearing 145°, will lead between Goso Sandroeta and the 4-fathom ($7^{m}3$) patch eastward of it.

Chart 2779.

Coast.—The coast between Ujong Onolimboe and Telok Dalam is unapproachable owing to the heavy swell. Ujong Suma, 2¼ miles south-south-eastward of Ujong Onolimboe, seen from north-westward, appears as a high, dark-coloured point, due to a dense growth of casuarina trees on it.

Off-lying islands and dangers.—Suma eilanden lie 2 miles eastward of Ujong Suma, and consist of two islands, Sumaseboea, covered with coconut palms, and noticeable for a large tree standing on its summit, 66 feet ($20^{m}1$) high, and Si Ide Ide, about half a mile east-south-eastward of it, which is thickly overgrown, but has no coconut palms on it.

A reef, with a coral cay above water on it, lies about one mile north-eastward of Si Ide Ide, and is marked by breakers.

Two 4½-fathom ($8^{m}2$) patches lie 1½ miles east-south-eastward, and 2¼ miles south-eastward, respectively, of Si Ide Ide.

A rock awash lies one mile east-south-eastward of Ujong Suma.

Coast.—Ujong Sjoeani (Shuani) lies about 4½ miles southward of Ujong Suma, and between it and Ujong Sumabawa, a noticeable point about 8¾ miles farther southward, a bank, with depths of less than 6 fathoms ($11^{m}0$), extends 4 miles offshore, and with depths of less than 3 fathoms ($5^{m}5$) for 2½ miles offshore. The coast here consists of sandy beaches, interspersed with boulders and is wooded with coconut palms. Sungei Soesoea (Susua) discharges about 1½ miles north-westward of Ujong Sumabawa; its valley is densely populated. Behind this stretch of coast, 8 miles west-south-westward of Ujong Sjoeani, is Lelegaga, 1,634 feet ($498^{m}0$) high, which, together with a white patch about 3 miles north-eastward of it, are noticeable. There is also a noticeable cleft at the northern end of a ridge of hills about 5 miles north-westward of Ujong Sumabawa.

Between Ujong Sumabawa (*Lat. 0° 49′ N., Long. 97° 54′ E.*), which is low, and Ujong Tedu Ichoe (Ichu), 11½ miles southward, the mountain ranges, which are higher in the southern portion, approach the coast. As far as Ujong Hilialawa, 7½ miles southward, the coast is fringed by a flat, with depths of less than 3 fathoms ($5^{m}5$), extending about 1¼ miles offshore. Northward of Ujong Goewacha (Guwacha), about 5 miles southward of Ujong Sumabawa, is the valley of the Masio, with a very large tree close southward of its mouth; the trunk alone rises above the tops of the trees around it. At Ujong Hilialawa there is a pointed hill, 299 feet ($91^{m}1$) high, with some coconut palms on it. Ujong Tedu Ichoe is low with coconut palms extending to the water's edge.

From Ujong Tedu Ichoe to Tanjong Batoe, about 5½ miles south-westward, the coast is wooded with coconut palms and there are several villages; the high land approaches close to the coast. Reef

Charts 2760, 748b.

Chart 2779.

prevents landing at most places, but it is possible at times at Bawezana, about 3¼ miles south-westward of Ujong Tedu Ichoe, and at Telok Walo, half a mile northward of Tanjong Batoe.

For Telok Dalam, *see* page 296.

Off-lying islet and dangers.—Sumabawa, an islet situated 5¼ miles south-eastward of Ujong Sjoeani, is fringed by a narrow reef.

A 3½-fathom (6^{m}4) patch lies about 2¼ miles north-north-westward of Sumabawa.

Makasser (Macassar) riffen consist of four isolated dangers, with depths of from 1¾ to 4½ fathoms (3^{m}2 to 8^{m}2), and deep channels between them, lying from 1¾ to 7 miles southward of Sumabawa, and from 6 to 7 miles offshore; they are marked by breakers or a heavy swell.

Argo, a reef, with a depth of 3 fathoms (5^{m}5), and marked by discolouration and at times by breakers, lies about 4 miles north-eastward of Ujong Tedu Ichoe.

A reef, with a depth of 4 fathoms (7^{m}3), lies about 2 miles north-eastward of Tanjong Batoe, and about 8 cables offshore.

Charts 2778, 2779.

REEFS BETWEEN NIAS AND SUMATRA.—The reefs at the northern end of this area have been described on page 288. Karang Kima, a reef which dries, and on which the sea breaks, lies 11½ miles south-eastward of Bintanah with several other reefs, one of which dries, and on which the sea breaks, lying north-westward and northward of it. A one-fathom (1^{m}8) patch lies 7 miles east-south-eastward of it.

Willem III is a patch of white coral, part of which is above water, lying on a reef which dries in places, about 5½ miles south-westward of Karang Kima. A 3-fathom (5^{m}5) patch lies about 2¾ miles northward of it, and another 3-fathom (5^{m}5) patch, named Noord Claudine, lies about 3 miles southward of it. Several patches, with depths of from 2¼ to 3½ fathoms (4^{m}1 to 6^{m}4), extend for 10½ miles south-eastward of Noord Claudine, and a 2¾-fathom (5^{m}0) patch lies 8 miles eastward of it.

Pandjang (*Lat. 1° 03′ N., Long. 98° 18′ E.*), a reef on which there are two rocks which dry, and always breaks, lies about 12 miles southward of Noord Claudine, and about 1½ miles inside the 100-fathom (182^{m}9) line. A 2¼-fathom (4^{m}1) patch lies 3¼ miles northward of it.

Chart 2779.

About 3½ miles eastward of Pandjang is a 5½-fathom (10^{m}1) patch, three-quarters of a mile southward of which is a 3½-fathom (6^{m}4) patch. Two patches, with depths of 6 and 7 fathoms (11^{m}0 and 12^{m}8) over them, lie about 5 miles southward of Pandjang.

About 13 and 16 miles southward of Pandjang are two patches, with depths of 6 and 5 fathoms (11^{m}0 and 9^{m}1), respectively, lying one mile and 1¼ miles, respectively, close inside the 100-fathom (182^{m}9) line. The sea breaks on the 5-fathom (9^{m}1) patch.

Charts 2778, 2779.

COAST.—The coast between Ujong Batoe Mamak (page 289) and Ujong Taboejoeng (Tabuyung), 46 miles southward, is free from danger beyond the distance of one mile; there is a reef, with a depth of

Charts 2760, 748b.

Charts 2778, 2779.

2 fathoms (3^{m}7), lying about three-quarters of a mile offshore, 13 miles southward of Ujong Batoe Mamak, and there is a rock above water, one mile offshore, about 14 miles northward of Ujong Taboejoeng.

The mountains approach this coast, but they are not conspicuous.

Ilir, an islet, 177 feet (53^{m}9) high, dark-coloured and wooded, lies about 18½ miles southward of Ujong Batoe Mamak and nearly 1¼ miles offshore.

Several rivulets discharge on this coast, Batang Toroe (Toru), at the entrance to which the sea breaks heavily, lies midway between Ujong Batoe Mamak and Ilir, and Air Batoe Moendom (Batu Mundom), north-eastward of Ilir; Batang Singkoeang (Singkuang) discharges 12 miles northward of Ujong Taboejoeng; it is navigable by praus for a considerable distance; the sea breaks heavily on the bar at the entrance.

Si Mandongoes, 1,247 feet (380^{m}1) high, with a few isolated trees on its summit, lies about 10 miles north-north-eastward of Ujong Taboejoeng, and 5 miles inland; it slopes gradually on its northern side, but more steeply southward.

Batu Margantoeng, 558 feet (170^{m}1) high, is an isolated conical, wooded hill, about 3¾ miles north-eastward of Ujong Taboejoeng, and is very noticeable from northward. *See* views facing page 303.

Chart 3851, plan of Tabuyung road.

Reede Taboejoeng.—Islets and dangers.—Light.—Reede Taboejoeng (Tabuyung) is an open roadstead situated northward of Ujong Taboejoeng, but partly sheltered by the islets of Tangah and Sidakah, about 3½ and 1½ miles, respectively, north-westward of Ujong Taboejoeng.

Ujong Taboejoeng may be identified by a hill of the same name, 371 feet (113^{m}1) high, about 8 cables south-eastward of it, and Batu Roesa (Rusa), 220 feet (67^{m}1) high, about 1½ miles farther south-eastward.

Tangah, a low wooded islet, is fringed by a reef which extends 8 cables north-westward from it.

Batu Simoenoe (Simunu), a rock above water, fringed by a reef which is steep-to, lies about 1½ miles north-westward of Tangah; between it and the reef extending north-westward from that island there is a deep passage about half a mile wide, but it is not recommended.

Sidakah, a low islet, is fringed by a reef, near the western extremity of which is Laboe (Labu), a sugar loaf-shaped islet. Landing may be effected on the eastern side of Sidakah and Tangah.

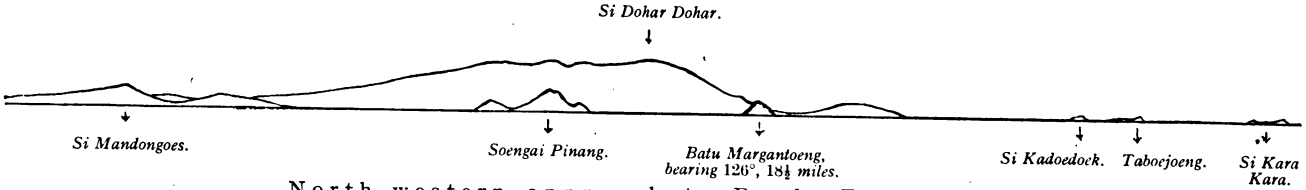
A light (*Lat. 0° 52′ N., Long. 98° 56′ E.*) is exhibited, at an elevation of 133 feet (40^{m}5), from a white iron framework structure, 46 feet (14^{m}0) in height, on the summit of Laboe.

Between Ujong Taboejoeng and the entrance to Batang Taboejoeng (Tabuyung), about three-quarters of a mile eastward, foul ground extends from one to 1½ cables northward. A rock above water lies 7 cables north-westward of the northern entrance point of the river, and breaks the force of the surf on the bar, over which there are depths of from 3 to 4 feet (0^{m}9 to 1^{m}2), thus enabling small craft to enter. Taboejoeng village stands on the north bank close to the entrance of the river.

Anchorages.—Directions.—Anchorage may be obtained either eastward of Tangah, in depths of from 10 to 11 fathoms (18^{m}3 to

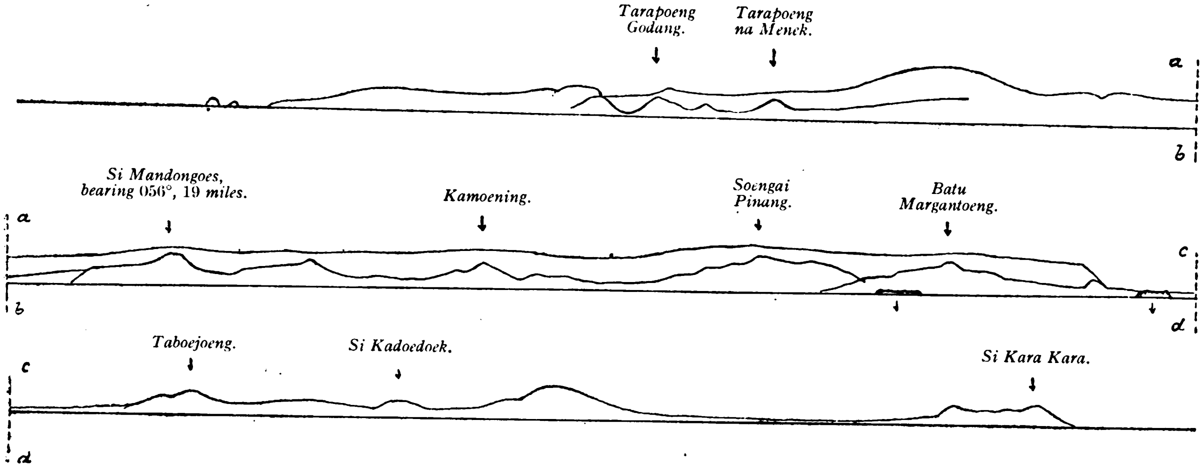
Charts 2760, 748b.

To face page 303.



North-western approach to Reede Taboejoeng.

(*Original dated* 1921.)



View, in three parts, of western approach to Reede Taboejoeng.

(*Original dated* 1929.)

Chart 3851, plan of Tabuyung road.

$20^{m}1$), clay, or eastward or southward of Sidakah, in depths of from 4 to 5 fathoms ($7^{m}3$ to $9^{m}1$), mud. Both anchorages are fairly sheltered from north-westerly winds, with good holding ground.

Vessels from northward should approach Reede Taboejoeng from along the coast, but from southward they should pass outside Sirene riffen (*see* below). Vessels passing westward of Tangah should give it a berth of 3 miles.

Chart 2779.

Coast.—The coast between Ujong Taboejoeng and Ujong Si Kara Kara, a low point, about 14 miles southward, is fronted by many dangers, some of which lie just within the 6-fathom ($11^{m}0$) line. The coast is generally low with a few isolated hills. Si Kadoedoek (Kaduduk), 456 feet ($139^{m}0$) high, with a noticeable tree on its summit, lies about 5½ miles south-eastward of Ujong Taboejoeng, and about three-quarters of a mile from the coast. About 14 miles eastward of Si Kadoedoek is Si Dohar Dohar, 6,158 feet ($1876^{m}9$) high; *see* view facing this page.

Off-lying islets and dangers.—Amboina, a reef with a depth of 1¼ fathoms ($2^{m}3$), lies about 3¼ miles southward of Ujong Taboejoeng, and just inside the 6-fathom ($11^{m}0$) line.

Ringawan, an islet fringed by a reef except on its western side, lies about 4½ miles south-south-eastward of Ujong Taboejoeng, and about 1½ miles offshore. About 2¾ miles farther southward and about 2 miles offshore, is Taloer, an islet surrounded by reef. There are several islets lying close inshore on this stretch of coast.

Sirene riffen consist. of four heads, of which the westernmost and southernmost have a depth of 3 feet ($0^{m}9$) over them, and on which the sea often breaks; the former lies 5½ miles west-south-westward of Taloer. Vessels are recommended not to pass between these reefs and the coast. A 4½-fathom ($8^{m}2$) patch lies 10 miles westward of Ujong Si Kara Kara.

Chart 3852, plan of Natal road.

Reede Natal and approaches.—Dangers.—Buoys.—Light.—Reede Natal lies off the coast between Ujong Si Kara Kara and Ujong Rakat, 6 miles southward; it is open westward and is encumbered with many dangerous shoals, rendering it one of the worst anchorages on the coast. The shore is fringed by a shallow bank, but with depths of less than 3 fathoms ($5^{m}5$) extending about 1½ miles off.

The limits of the road are the parallels of lat. 0° 34′ N. and lat. 0° 32′ N. and the meridian of long. 99° 04′ E.

Si Kara Kara (*Lat. 0° 38′ N., Long. 99° 05′ E.*), a hill, 961 feet ($292^{m}9$) high, lies about 2¼ miles north-eastward of Ujong Si Kara Kara; from southward it appears as a long ridge, with a peak at each end. Batu Kandang, 207 feet ($63^{m}1$) high, lies close to the coast, 1½ miles west-north-westward of Si Kara Kara; it is noticeable from southward, appearing as a round hillock with scattered trees on it. About 1¼ miles northward of Ujong Si Kara Kara is Kapetjong (Kapechong), an islet lying on the edge of the reef extending about 2¾ cables offshore. *See* views facing this page.

Mandera, a hill, 358 feet ($109^{m}1$) high, lies 5¼ miles south-eastward of Ujong Si Kara Kara, and about three-quarters of a mile north-north-eastward of Natal settlement; it is wooded, appears wedge-shaped from north-westward, and, having low land on either side, is noticeable.

Charts 2760, 748b.

Charts 3852, plan of Natal road, 2779.

Kapetjong (Kapechong), a reef with a depth of 3¾ fathoms ($6^{m}9$), lies about 3¾ miles north-westward of Ujong Si Kara Kara. Pemoeda (Pemuda), a reef with a depth of 2¾ fathoms ($5^{m}0$), lies about 1¾ miles west-south-westward of Ujong Si Kara Kara, and a 4¾-fathom ($8^{m}7$) patch lies half a mile south-south-westward of Pemoeda. Gosong Si Kara Kara, the only reef in the road on which the sea breaks, has a depth of 3 feet ($0^{m}9$) over it, and is situated 1½ miles southward of Ujong Si Kara Kara. Oenggas (Unggas), a rock above water, fringed by a reef, lies about 8 cables south-south-eastward of Ujong Si Kara Kara.

A 4-fathom ($7^{m}3$) patch lies 14 miles west-south-westward of Ujong Si Kara Kara. Saboejoeng (Sabuyung), a reef with a depth of 4 fathoms ($7^{m}3$), lies about 8 miles south-westward of the same point, and a 2-fathom ($3^{m}7$) patch lies 11 miles farther south-westward.

Bajang (Bayang), a reef with a depth of less than 6 feet ($1^{m}8$), lies about 4½ miles south-westward of Ujong Si Kara Kara; it shows by discolouration and is marked on its south-eastern side by a white conical buoy surmounted by a ball.

Laoet (Laut), a reef with a depth of one fathom ($1^{m}8$), lies 7½ miles westward of Ujong Rakat. Kapal, a reef with a depth of one fathom ($1^{m}8$), lies about 3¾ miles westward of the same point. A 2-fathom ($3^{m}7$) patch lies 3½ cables north-westward of Kapal.

A black can buoy, surmounted by a truncated cone, is moored 9 cables westward of Kapal.

Tètè, a reef with a depth of 2½ fathoms ($4^{m}6$), lies 2½ miles westward of Ujong Rakat. Between this reef and Ujong Rakat are the reefs of Hiau, Bambang, and Blatok, the positions and depths over which can best be seen on the chart. The passage between this point and these reefs is marked on either side by unofficial beacons. Siobong, with a depth of 3¼ fathoms ($5^{m}9$), and Sigale, with 2¾ fathoms ($5^{m}0$), lie about 1¼ miles west-south-westward and 2½ miles southward, respectively, of Ujong Rakat. Sigale is not marked by discolouration.

A light (*Lat. 0° 33′ N., Long. 99° 06′ E.*) is exhibited, at an elevation of 24 feet ($7^{m}3$), from a white mast on the northern side of the entrance to Batang Natal, 1¾ miles north-eastward of Ujong Rakat.

Anchorages.—Directions.—Anchorage may be obtained, in depths of from 4 to 6 fathoms ($7^{m}3$ to $11^{m}0$), soft clay, about 2½ miles offshore, with Mandera bearing 090°. Small craft may anchor closer inshore, in a depth of 2¾ fathoms ($5^{m}0$).

A vessel approaching from northward should pass between Sirene riffen and the 4½-fathom ($8^{m}2$) patch about 5 miles south-westward of the westernmost head, thence northward of Bajang white conical buoy, with Mandera bearing 103°, and thence to the anchorage.

Approaching from southward, she should pass westward of the black can buoy off the western side of Kapal, thence steer for Si Kara Kara hill, bearing about 038°, until Mandera bears 090°, when she should steer for the anchorage.

The hills Batu Kandang, Si Kara Kara, and Mandera are useful marks for avoiding the reefs in the approach to Reede Natal, except the 2-fathom ($3^{m}7$) reef, 20 miles westward of Ujong Rakat, near which none of these hills can be seen.

Chart 3852, plan of Natal road.

Natal.—The settlement of Natal stands on the northern side of

Chart 3852, plan of Natal road.

the entrance to Batang Natal, which is navigable as far as Tapoes (Tapus), 18 miles up. Natal is the residence of an Administrator. The export of coffee is the only trade.

There is a landing place inside the mouth of the river, but on account of the shifting bar and heavy breakers, it is advisable to employ a native fisherman as pilot.

There is regular communication by steamer with other ports in Sumatra.

Chart 2779.

Telok Brambang.—Dangers.—Telok Brambang is an open bight entered between Ujong Soemoer (Sumur), about $1\frac{3}{4}$ miles southward of Ujong Rakat, and Ujong Palimboengan, about $9\frac{1}{2}$ miles southward.

Radja (Raja) Inda are two patches, with depths of $2\frac{1}{4}$ and $2\frac{1}{2}$ fathoms ($4^{m}1$ and $4^{m}6$) over them, lying about 4 and $4\frac{1}{4}$ miles, respectively, southward of Ujong Soemoer, and $2\frac{1}{4}$ miles offshore. They are not marked by discolouration.

A reef extends about one mile south-westward from a point situated about $1\frac{3}{4}$ miles south-eastward of Ujong Soemoer.

Chart 3852, plan of Temang road.

Reede Temang.—Light.—Reede Temang is situated at the southern end of Telok Brambang. Batahan village stands on the northern side of the entrance to Batang Batahan, about $3\frac{1}{2}$ miles north-north-eastward of Ujong Palimboengan; it is navigable by boats as far as Barma Sawah. Kikiran, a hill 427 feet ($130^{m}1$) high, with a high tree on its conical summit, lies about 2 miles north-north-eastward of Ujong Palimboengan.

Temang, an island, 144 feet ($43^{m}9$) high, and easy to identify, lies about one mile north-north-westward of Ujong Palimboengan; it is fringed by a reef, except at its western end where there is a depth of 6 fathoms ($11^{m}0$) about $1\frac{1}{4}$ cables offshore. *See* view facing page 313. There is a village on the eastern side of the island.

Saonee, a shoal with a depth of $6\frac{1}{2}$ fathoms ($11^{m}9$), lies three-quarters a mile westward of the western extremity of Temang.

A light (*Lat. 0° 22′ N., Long. 99° 05′ E.*) is exhibited, at an elevation of 211 feet ($64^{m}3$), from a white iron framework structure, 72 feet ($21^{m}9$) in height, on the western side of Temang.

Anchorage.—Directions.—Good anchorage may be obtained, in a depth of 9 fathoms ($16^{m}5$), clay, between Temang and the main island, with the northern extremity of Temang bearing about 315°, and Ujong Palimboengan, 180°.

Charts 3852, plan of Temang road, 2779.

Small craft may approach the anchorage from southward by passing between Temang and Ujong Palimboengan, where there are depths of from 6 to 11 fathoms ($11^{m}0$ to $20^{m}1$) in the fairway; if proceeding northward to Reede Natal they should keep in a depth of 9 fathoms ($16^{m}5$) so as to avoid the dangers in Telok Brambang, and when near Ujong Soemoer, by keeping in depths of from 4 to 5 fathoms ($7^{m}3$ to $9^{m}1$), they will pass eastward of Siobong.

Chart 2779.

Coast.—Between Ujong Palimboengan and Ujong Toean (Tuan), about $5\frac{3}{4}$ miles southward, the coast forms a bight, with depths of less than 6 fathoms ($11^{m}0$), extending beyond the line joining the entrance points. Sandaran Galah, 971 feet ($296^{m}0$) high, with a flat top and

Charts 2760, 748b.

Chart 2779.

regular sloping sides, lies about 1¼ miles eastward of Ujong Palimboengan.

Ujong Toean, a rocky point, may be identified by Gunong Oedjoeng Toean, 574 feet ($175^{m}0$) high, with a noticeable broad conical summit, close south-eastward of it. Roebiah (Rubiah), an islet, lies on the outer edge of the reef which extends about 3 cables from the coast just northward of Ujong Toean. About 2¾ miles south-eastward of Ujong Toean is Ujong Biang, a rocky point, three-quarters of a mile northward of which is Gunong Oedjoeng Biang, 715 feet ($217^{m}9$) high, with a flattened double peak, which is noticeable. Between Ujong Biang and Ujong Batoe Barlajar (Batu Barlayar), about 6 miles east-south-eastward, the coast is indented. Bargambar, a hill, 896 feet ($273^{m}1$) high, lies about 3½ miles eastward of Ujong Biang and about half a mile inland. It is very noticeable from southward, appearing as a blunted knoll rising from an extensive mountain ridge.

Off-lying dangers.—Beacon.—Buoy.—Pylades riffen, consisting of three heads, with a least depth of 2½ fathoms ($4^{m}6$), lies about 18 miles west-north-westward of Ujong Toean; they are generally difficult to distinguish, but occasionally they may be discerned by tide-rips or by the swell.

Bargambar, bearing more than 112°, open northward of Gunong Oedjoeng Toean, leads northward of Pylades riffen; Bargambar, bearing less than 105°, open southward of Gunong Oedjoeng Biang, leads southward of them.

Bajang (Bayang), a reef with a depth of 3 fathoms ($5^{m}5$), marked by discolouration, and steep-to, lies about 7¾ miles westward of Ujong Toean; between them are several reefs, the positions of which can best be seen on the chart, with depths of from 4½ to 7 fathoms ($8^{m}2$ to $12^{m}8$) over them, on which the sea does not break, nor are they marked by discolouration, but there are tide-rips over them, especially during October and November.

Montrado, a reef with a depth of 2 fathoms ($3^{m}7$), lies about 3½ miles south-westward of Ujong Toean. Karang Oedjoeng (Ujong) Biang, with a depth of 1½ fathoms ($2^{m}7$), and occasionally marked by tide-rips, lies 2 miles west-south-westward of Ujong Biang.

A white beacon, surmounted by a ball, stands on Karang Oedjoeng Biang.

Laboean Loeloe (Labuan Lulu) (*Lat. 0° 10′ N., Long. 99° 10′ E.*), a reef with a depth of 3½ fathoms ($6^{m}4$), and not marked by discolouration, lies about 3¼ miles southward of Ujong Biang. Makasser (Macassar), a reef with a depth of 1½ fathoms ($2^{m}7$), and steep-to, lies 7½ miles south-south-eastward of Ujong Biang; it is not marked by discolouration, and the sea never breaks on it. Van Speijk (Speyk), a reef with a depth of 2 fathoms ($3^{m}7$), and steep-to, lies 10½ miles south-south-eastward of Makasser reef. Moller, a reef with a depth of one fathom ($1^{m}8$) and steep-to, lies about 5 miles south-eastward of Van Speijk, and is marked on its north-eastern side by a white conical buoy surmounted by a ball. Gosong Satoe (Satu), which dries and is steep-to, lies 9 miles south-south-eastward of Ujong Sawang Poeding (Puding), about 9 miles east-south-eastward of Ujong Batoe Barlajar, and 7 miles offshore; the sea always breaks on it.

Gosong Doea (Dua) consist of two heads about 2 cables apart, which

Charts 2760, 748b.

Chart 2779.

dry, are steep-to, and on which the sea always breaks; they lie about 5¾ miles south-south-eastward of Ujong Sawang Poeding, and 4½ miles offshore. Sylph, a reef with a depth of 3 feet ($0^{m}9$), lies about 3¼ miles south-south-eastward of the same point and 2½ miles offshore. Sikilang, a reef with a depth of 5 feet ($1^{m}5$), lies 8¼ miles east-south-eastward of Ujong Sawang Poeding, and about one mile from the mouth of Sungei Sikilang.

Current.—In the passage between Pini (page 320) and the Sumatra coast, the current sets south-eastward during the months of October and November, at a rate of from one to 5 knots. At these times the dangers mentioned above are sometimes marked by tide-rips.

Chart 3851, plan of Ayerbangis bay.

Baai van Ajerbangis.—Dangers.—Light.—Baai van Ajerbangis (Ayerbangis) is entered between Ujong Batoe Barlajar and Ujong Sawang Poeding. The shores on either side of the bay are hilly, but are low at the head. Sitjangang (Sityangang), 1,165 feet ($355^{m}1$) high, lies about 1½ miles north-eastward of Ujong Sawang Poeding; it is very noticeable from southward, appearing as a flattened cone with a wide level summit.

Ujong Batoe Barlajar may be identified by a hill, 164 feet ($50^{m}0$) high, with a solitary small tree on it, at the extremity.

Ayer Bangis discharges on the eastern side of the bay, about 3 miles northward of Ujong Sawang Poeding. A beacon marks either side of the channel in the approach to the entrance. Ajerbangis village stands on the northern side of the entrance.

There is regular communication by steamer with other ports in Sumatra.

Poegago (Pugago) is a low islet covered with coconut palms lying 1¾ miles south-south-eastward of Ujong Batoe Barlajar. It is fringed by a reef, except on its north-eastern side. A rock, with a depth of 3 feet ($0^{m}9$), lies 2 cables north-westward of its north-western extremity, and a reef, which is easy to distinguish, lies 7 cables west-north-westward of the same point.

Pandjang (*Lat. 0° 11′ N., Long. 99° 18′ E.*) is an island, 246 feet ($75^{m}0$) high at its south-eastern end, lying 1¼ miles north-eastward of Poegago; it is fringed by a reef which extends about half a mile westward from its south-western side; near the edge of this projecting reef is an islet, named Taming. Landing may be effected on the eastern side of the island.

Kasi is a reef easy to distinguish, lying 7 cables north-eastward of the northern extremity of Pandjang.

Panggalaran, an island, 623 feet ($189^{m}9$) high, with a sharp peak, lies close offshore, about 1¼ miles north-eastward of Ujong Batoe Barlajar. A reef, on which is a rock, named Batu Oelar (Ular), extends about 3½ cables eastward from the south-eastern side of the island. Oenggas (Unggas), a low islet, lies 5½ cables northward of Batu Oelar.

Pangkal, an island with a sharp conical peak, 174 feet ($53^{m}0$) high on its south-western side, lies 1¾ miles south-south-eastward of Poegago. A shoal, with a depth of 1¾ fathoms ($3^{m}2$), lies about 3 cables eastward of the light structure.

Pangkal, bearing 315°.
(*Original dated* 1929.

Charts 2760, 748b.

Chart 3851, plan of Ayerbangis bay.

Pangkal light-structure. (*Original dated* 1913.)

A light is exhibited, at an elevation of 185 feet ($56^{m}4$), from a white iron framework structure, 26 feet ($7^{m}9$) in height, on the south-eastern extremity of Pangkal.

Taloer (Talur), a low islet covered with coconut palms and fringed by a reef, lies 2¾ miles south-westward of Ujong Sawang Poeding. A reef, with a depth of 3 feet ($0^{m}9$), lies about 9 cables northward of Taloer.

Sikarbau consists of two reefs lying about 2¼ miles southward of Ujong Sawang Poeding; the north-eastern reef dries; the south-western reef is difficult to distinguish.

Anchorages.—Directions.—Anchorage may be obtained eastward of Pandjang, in depths of from 6 to 7 fathoms ($11^{m}0$ to $12^{m}8$), with the summit of the island bearing not less than 270°. Small craft may anchor one mile west-north-westward of the mouth of Ayer Bangis, in a depth of about 2½ fathoms ($4^{m}6$).

Small craft making for the mouth of the river from the outer anchorage should keep close northward of the reef extending from the southern side of the entrance, on which the sea seldom breaks, although a heavy swell is frequently experienced in the bay.

Chart 2779.

Approaching Baai van Ajerbangis from northward a vessel should pass about 2 miles westward of Bajang, and when Ujong Biang bears 090° she should steer about 130°, until the south-eastern extremity of Poegago is in line with the southern extremity of Pandjang, bearing about 068°, when she should keep on this alignment, which leads between Laboean Loeloe and Makasser riffen; then she should pass between Poegago and Pangkal and thence steer for the anchorage.

Small craft approaching from northward by the inshore route, after passing through the channel between Temang and Ujong Palimboengan, should steer to pass fairly close to Ujong Toean, so as to avoid the reefs westward of it; when this point bears 090° they should steer to pass between Ujong Biang (*Lat. 0° 13′ N., Long. 99° 10′ E.*) and the white beacon on Karang Oedjoeng Biang, thence southward of Poegago and thence to the anchorage. Vessels with local knowledge pass northward of Poegago and Pandjang, thence between the latter island and Kasi, and to the anchorage.

A vessel approaching from southward should keep Pangkal in line with Bargambar hill, bearing 320°, which leads between Van Speijk and Gosong Doea; when Taloer is in line with Sitjangang, bearing about 053°, she should steer for the anchorage.

PULAU NIAS GREAT CHANNEL.—Pulau Nias Great channel, between Nias and Batoe (Batu) eilanden, is 37 miles wide, and appears to be clear of dangers, but a good look out should be kept for possible unknown dangers. A bank, however, with a least depth of 13 fathoms ($23^{m}8$), extends 24 miles southward from the southern extremity of Nias.

Charts 2760, 748b.

Chart 2779.

The southern coast of Nias, which forms the northern side of Pulau Nias Great channel, has been described on pages 295-297.

Southern side of Pulau Nias Great channel.—The southern side of this channel is formed by Batoe eilanden, consisting of three large islands, Tanah Masa, Tanah Bala and Pini, with several islets, fringed by extensive coral reefs.

Simoek.—Simoek (Simuk), the westernmost island of the group, is low, but covered with high trees. There is a small inlet on the western side of the island, which affords shelter for boats with local knowledge; the approach to it is narrow with a depth of 5½ fathoms ($10^{m}1$), and the entrance is difficult to distinguish until close to.

Reefs extend from all sides of the island except the north, where there is a sandy beach. A 2-fathom ($3^{m}7$) patch lies one mile south-westward of the western extremity of the island and is often marked by breakers. A sunken reef, on which the sea generally breaks, lies about 6 cables from the middle of the eastern side of the island. A bank, with depths of less than 5 fathoms ($9^{m}1$), extends about 2 miles southward from the southern extremity.

Chart 3854.

Sigata.—Light.—Sigata, an island, 17 miles eastward of Simoek, is 384 feet ($117^{m}0$) high on its eastern side, where it is steep and noticeable from southward, and, except for a slight elevation on the western side, the island is flat. It is fringed by a reef which extends about 6 cables from its southern side, and is steep-to, and on which the sea always breaks. The depths westward of the island are very irregular.

There are several villages on the island, of which the principal is Bawuhsetra, at the northern end.

A light is exhibited, at an elevation of 382 feet ($116^{m}4$), from a white iron framework structure, 115 feet ($35^{m}0$) in height, on the eastern side of Sigata.

Anchorage.—The least unfavourable anchorage is off Bawuhsetra village, in depths of from 9 to 10 fathoms ($16^{m}5$ to $18^{m}3$), and here is also the best landing place. Farther south there are boulders along the coast; the western side is usually unapproachable during the whole year on account of heavy breakers.

Northern side of Tanah Masa.—Anchorage.—The northern coast of Tanah Masa is low and fringed by a reef, which extends 3 cables westward from Ujong Seropi (*Lat. 0° 01′ S., Long. 98° 17′ E.*), the western extremity of the island. Tanjong Batoe (Batu) Wawa, the north-eastern extremity, is also low, and covered with coconut palms, but it becomes hilly close inland.

Anchorage may be obtained in the bay on the western side of Tanjong Batoe Wawa, in depths of from 6½ to 7½ fathoms ($11^{m}9$ to $13^{m}7$).

Chart 3855, plan of Approaches to Tello.

Off-lying islands and dangers.—Numerous islands and dangers lie off the northern end of Tanah Masa. Tagaga, a low wooded island, with a fringing reef which extends about 3 cables from its northern side, lies 6½ miles north-westward of Ujong Seropi. About three-quarters of a mile eastward and 1½ miles southward of Tagaga are Biang and Baligi, respectively, low islands, on each of which is a noticeable tree. The fringing reef around Biang is one cable wide and very steep-to.

Charts 2760, 748b.

Chart 3855, plan of Approaches to Tello.

Lorang, a low island, covered with coconut palms, lies 4 miles west-north-westward of Ujong Seropi. It is fringed by a reef which extends, with a depth of 4 fathoms (7^m3) at its outer end, about 1½ miles south-westward from its southern side.

Chart 3854.

A reef, with a depth of 3½ fathoms (6^m4), and on which the sea breaks heavily at times, lies about 3¼ miles south-westward of Lorang, and a 7-fathom (12^m8) patch lies 2½ miles south-south-westward of the same island.

Chart 3855, plan of Approaches to Tello.

About three-quarters of a mile eastward of Lorang, is Marit or Marik, a hilly island covered with coconut palms; its north-western side is fringed by a reef. About 4 cables southward of Marit is Batoe (Batu), consisting of several masses of pointed rocks, covered with vegetation, which appear to be separate islets from a distance eastward or westward.

For the islands farther south-eastward, *see* page 311.

Memong, a low wooded island, lies 4 miles northward of Ujong Seropi; it may be identified by a large rock above water, about 2 cables from its north-western side, which is visible for several miles. There are many reefs between Memong and the northern side of Tanah Masa, the positions of which can best be seen on the chart. There is a 3-fathom (5^m5) patch about midway between Memong and Biang.

The eastern extremity of Marit in line with the western extremity of Loeloea (Lulua), 2¼ miles south-south-westward, bearing 196°, leads between this patch and Memong.

Chart 3854.

A reef, with a least depth of 5 fathoms (9^m1), lies about three-quarters of a mile east-north-eastward of Memong, and a 7-fathom (12^m8) patch lies 3¾ miles north-eastward of the same island. A reef, with a depth of 2½ fathoms (4^m6), lies 4½ miles eastward of Memong and 3¼ miles from the northern extremity of Tanah Masa, and a reef with the same depth lies about 1¾ miles northward of the middle of the northern coast of Tanah Masa, with irregular depths of less than 10 fathoms (18^m3) between.

The reefs off the northern coast of Tanah Masa have not been observed to break, and only under favourable conditions do they show by discolouration.

Foul ground extends about 4¼ miles north-eastward from Tanjong Batoe Wawa (*Lat. 0° 00′, Long. 98° 24′ E.*), with a 3½-fathom (6^m4) patch at its outer end.

Chart 3855, plan of Channels off the north-east coast of Tanah Masa.

Lago, a low island covered with coconut palms, lies near the eastern edge of the foul ground extending north-eastward from Tanjong Batoe Wawa, and about 3 miles from that point. A sand cay lies on a reef about one mile westward of the southern extremity of Lago.

Chart 2779.

BATOE EILANDEN.—Batoe (Batu) eilanden are sparsely populated, especially the larger islands, the most frequented being Tello and Sigata. Most of the inhabitants are Niassers, the remainder being of Malay or Bugi origin, with a few scattered Chinese traders.

Charts 2760, 748b.

Chart 2779.

The main industry is coconut culture. The islands produce timber of excellent quality, which is exported; other exports are camphor, resin, dried fish, and trepang.

Chart 3854.

Tanah Masa.—Tanah Masa, the central and largest of the group, is, like Tanah Bala and Pini, moderately high and wooded, but it has no noticeable summits, except Hill B, 669 feet ($203^{m}9$) high, about 8 miles from Tanjong Seiro, the southern extremity of the island, and which is visible from south-eastward and eastward for a considerable distance.

Western side of Tanah Masa.—The western coast of Tanah Masa is low. Tanjong Fatelesa, 6¾ miles south-eastward of Ujong Seropi, has some trees on it. About 4¾ miles farther south-eastward is Tanjong Sepremong, with a reef, on which is Simondong, a low islet covered with coconut palms, extending 6 cables south-westward from it. Hill A, about 3¼ miles farther south-eastward, is almost indistinguishable from the hills south-eastward of it, but can be identified from southward.

Charts 3855, plan of Approaches to Tello, 3854.

Off-lying islands and dangers.—Tello, the most important and most populous island of the Batoe group, lies with its northern extremity about 1½ miles south-westward of Ujong Seropi. On its flat summit, 295 feet ($89^{m}9$) high, situated at the northern end of the settlement on the eastern side of the island, are some noticeable trees. About 1½ miles farther southward is another hill with a clump of trees on its summit. Poeloe (Pulu) Tello, the principal settlement, is situated on the eastern side of the island about 1¼ miles from the northern extremity, and Si Rapa Rapa village, about 1¾ miles southward of it.

Loeloea or Silaloeang and Sibolo are two islands lying off the north-western end of Tello. Sibolo is 246 feet ($75^{m}0$) high and prominent. Loeloea is lower and fringed by a reef; between it and Batoe there are depths of from 2¼ to 6 fathoms ($4^{m}1$ to $11^{m}0$), and a 2-fathom ($3^{m}7$) patch lies 8 cables northward of Loeloea. A 4½-fathom ($8^{m}2$) patch lies three-quarters of a mile westward of Sibolo. A reef extends a quarter of a mile northward from the northern extremity of Tello, and a shoal, with a least depth of 2¼ fathoms ($4^{m}1$), lies 4½ cables north-north-eastward of the point.

Chart 3854.

Batu Makele and Antinang, close northward of it, are hilly islands lying eastward of Tello; there is a noticeable tree about the middle of the western side of Batu Makele. Gabaya (*Lat. 0° 05′ S., Long. 98° 21′ E.*) and Buhluhgia are two low islets lying between the eastern side of Batu Makele and Tanah Masa.

Pono, Sipika, and Pertamoean or Fatamoea are hilly islands lying southward of Batu Makele, from which the northern side of Sipika is separated by a narrow channel, navigable for small craft with local knowledge, but there is a rock, with a depth of 2¼ fathoms ($4^{m}1$), in the middle of its narrowest part; the greatest depths are on the northern side. These islands are mostly fringed by reef, which extends about 6 cables from the south-eastern end of Sipika; the fringing reef on the western side of Pono is very steep-to, and always marked by breakers.

The south-eastern extremity of Sipika is low and covered with coconut palms; on its south-western side are some hills of a light green

Charts 2760, 748b.

Chart 3854.

colour, and on its north-eastern point is a noticeable umbrella-shaped tree which is visible from a considerable distance southward.

Chart 3855, plan of Approaches to Tello.

A detached reef, about one mile south-south-westward of Pono, is always marked by breakers.

Sibranoen, about three-quarters of a mile westward of Pono, and Hajau (Hayau), about one mile farther in the same direction, are both low islets covered with coconut palms; they are fringed by reef, and on that extending from the southern point of Sibranoen are three rocks covered with vegetation. Nauta stone, above water, lies about 3½ cables southward of the same point. A 2½-fathom ($4^{m}6$) patch lies about half a mile south-south-eastward of the southern extremity of Hajau.

Bintoeang (Bintuang), a low island, covered with coconut palms and fringed by a reef, lies between Hajau and Sigata.

Straat Tello.—Lights.—Beacon.—Danger.—Straat Tello is the channel trending north and south between Tello and Sibranoen on the west, and Batu Makele, Pertamoean, and Pono on the east.

A 3½-fathom ($6^{m}4$) patch, which is steep-to, lies about half a mile north-eastward of the flagstaff, situated at the northern end of Poeloe Tello.

About 3 cables south-eastward of the flagstaff is a rock, which dries, marked by a white beacon, surmounted by a ball.

A light is occasionally exhibited, at an elevation of 41 feet ($12^{m}5$), from a white iron beacon, on the northern extremity of the reef extending 3½ cables northward from the northern extremity of Batu Makele.

A light is occasionally exhibited, at an elevation of 67 feet ($20^{m}4$), from a white iron beacon, on the northern extremity of Batu Makele.

A detached reef lies about 3½ cables from the western side of Antinang.

The western side of Batu Makele is fringed by a reef which extends about three-quarters of a cable offshore at the southern end. Some sunken rocks lie about 3 cables southward of the western extremity of Batu Makele, and a reef extends about 4 cables westward from the south-western side of the island.

Poeloe Tello.—Light.—Poeloe Tello is the headquarters of an Administrator and a mission station. The population, in 1945, was about 3,000.

There are two stone piers. There is a depth of about 21 feet ($6^{m}4$) at the head of the main pier, which is about 200 feet ($61^{m}0$) long.

A light (*Lat. 0° 03′ S., Long. 98° 17′ E.*) is exhibited, at an elevation of 30 feet ($9^{m}1$), from the flagstaff.

A few provisions may be obtained.

There is regular communication by steamer with ports in Sumatra.

Anchorages.—Directions.—Sheltered anchorage may be obtained off Poeloe Tello in depths of from 11 to 15 fathoms ($20^{m}1$ to $27^{m}4$), good holding ground, with the flagstaff bearing between 250° and 286°; also between the white beacon and the settlement, in about the same depth.

Chart 3854.

The most convenient channels leading to Poeloe Tello from southward and south-eastward are along the southern and western sides of haped

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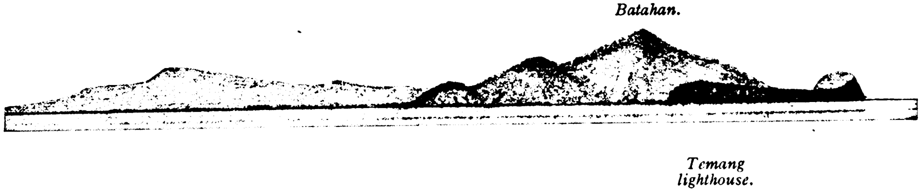
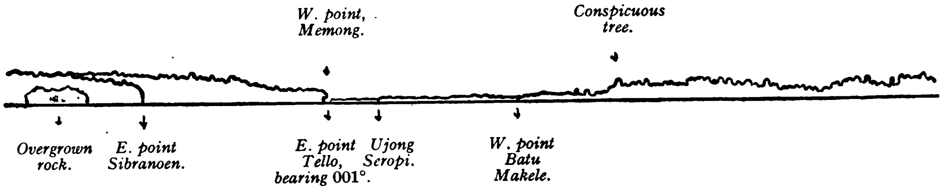


South-western approach to Temang from vicinity of Karang Bajang.

(*Original dated* 1902.)


W. point, Memong.
Conspicuous tree.
Overgrown rock.
E. point Sibranoen.
E. point Tello, bearing 001°.
Ujong Seropi.
W. point Batu Makele.

Southern approach to Straat Tello.

(*Original dated* 1929.)

Chart 3854.

Tanah Bala, or through Straat Tanah Bala (page 314) and from eastward, along the northern side of Pini.

In clear weather, the mountains Si Dohar Dohar and Talamau, in Sumatra (chart 2779) are visible throughout the Batoe group; Nias is visible from the northern end and Siberoet from the southern end.

Approaching Straat Tello from northward, a vessel should pass between Memong and the 3-fathom (5^m5) patch westward of it, by keeping the eastern extremity of Marit in line with the western extremity of Loeloea, bearing 196°; when the light structures on the northern extremity of Batu Makele and on the reef extending northward from it are in line, bearing 161°, she should steer on this alignment, which will lead to the anchorage north-eastward of the white beacon.

If approaching along the northern coast of Tanah Masa, the south-eastern extremity of Sibolo in line with, or just shut in by the northern extremity of Tello, bearing about 237°, leads between the reefs off the northern coast of Tanah Masa; this alignment should be kept on until the northern extremity of Marit is in line with the northern extremity of Baligi, bearing about 281°, when the vessel will be clear of the reefs lying southward of Memong; then she should alter course westward, and when the leading light structures are in line, bearing 161°, she should proceed as directed above.

Chart 3855, plan of Approaches to Tello.

A vessel approaching from southward, should keep the eastern edge of Tello, at Si Rapa Rapa village, in line with the western extremity of Memong, bearing 001° (*see* view facing this page), or if the latter point is not visible, she should steer for the former point, bearing 001°, until the overgrown rock on the reef on the eastern side of Sibranoen is abeam, when she should steer for the noticeable tree on the western side of Batu Makele, bearing 012°, which leads midway between Sibranoen and the western edge of the drying reef on the western side of Pono; when the eastern edge of Tello, near the flagstaff, is in line with the eastern extremity of Marit, bearing 342°, she should steer on that alignment, which will lead to the anchorage westward of the white beacon. If it is intended to anchor north-eastward of the beacon, when the eastern edge of Tello, near Si Rapa Rapa village, is in line with the eastern extremity of Sibranoen, bearing 185°, she should keep these marks on astern, or else steer for Ujong Seropi (*Lat. 0° 01′ S., Long. 98° 17′ E.*); when the flagstaff bears 286°, the vessel will be clear of the drying reef marked by the white beacon.

Chart 3854.

To pass through the channel between Batu Makele and the western side of Tanah Masa, a vessel with local knowledge approaching from the southward should steer for Buhluhgia, bearing 000°, until Tanjong Fatelesa bears 045°, then steer to pass midway between that point and the reef extending southward from Buhluhgia, thence midway between this reef and a 2¼-fathom (4^m1) patch eastward of it, thence in mid-channel between the north-eastern side of Batu Makele and Gabaya, and thence between the reef extending three-quarters of a mile north-eastward from the north-eastern extremity of Batu Makele and the western side of Tanah Masa; when Loeloea is open of the northern extremity of Tello, and when the summit of Tello, bearing about 268°, is open of the northern extremity of Antinang, the vessel

Chart 3854.

should alter course westward, and when the flagstaff at Poeloe Tello bears about 250°, she may steer for the anchorage.

Chart 3855, plan of Tanah Bala strait.

Straat Tanah Bala.—Dangers.—Straat Tanah Bala, separating the north-eastern side of Tanah Bala from Tanah Masa, is a convenient channel by day for vessels bound from Padang to Poeloe Tello, or vice versa; it is always calm. The shores on both sides are low, and the south-western side is almost completely overgrown with mangroves. The north-eastern side is higher, with coconut palms in places.

The least depth in the navigable channel is about 7 fathoms ($12^{m}8$).

From Tanjong Pasalahang, the northern extremity of Tanah Bala, a bank, on which there are depths of less than 6 fathoms ($11^{m}0$), extends 4¼ miles north-westward. Near the outer end is Tello Tello kechil, and about 1¼ miles south-eastward of it is Tello Tello gedang, both low islets fringed by a reef, with a least depth of 2½ fathoms ($4^{m}6$) between them; there is, however, a noticeable pointed hillock, covered with coconut palms, on the southern end of Tello Tello gedang.

Samaleko, a flat islet, except for a small hummock at its western end, lies 6 cables north-westward of Tanjong Pasalahang. Between it and Tello Tello gedang there is a least depth of 3 fathoms ($5^{m}5$) in the middle, and between it and the reef extending from Tanjong Pasalahang, there is a channel about one cable wide, with a depth of 6 fathoms ($11^{m}0$).

A shoal, with a least depth of 4½ fathoms ($8^{m}2$), lies 8½ cables eastward of the southern extremity of Tello Tello gedang.

Boeni (Buni) gedang, about 1½ miles south-eastward of the point situated 1¾ miles eastward of Tanjong Pasalahang, and Boeni (Buni) kechil, about 1½ miles south-south-eastward of Boeni gedang, are reefs with sand cays, partly covered with vegetation. Tono, close to the south-western shore westward of Boeni kechil, Soroboena on the north-eastern side of the channel, 3½ cables south-eastward of Boeni kechil, and Somoloko, on the south-western side, 1¼ miles southward of Soroboena, are low islets, overgrown with mangroves. On the western side of Soroboena is a house and a small clump of coconut palms; this side of the islet is steep-to. Tono is very difficult to distinguish.

Noedjalalei (Nujalalei) (*Lat. 0° 20′ S., Long. 98° 31′ E.*), on the eastern side of the channel, about 2¼ miles south-south-eastward of Soroboena, is a wooded islet with coconut palms on it; there is a stone pier on its western side, with a flagstaff on it; the pier is accessible for boats at high water only. A rock, which dries, lies about one cable from the north-western side of the island. In the narrow passage between Noedjalalei and Tanah Masa there is a least depth of 3 fathoms ($5^{m}5$).

Tegawa kechil, overgrown with mangroves, and Tegawa gedang close southward of it, are islets lying on the western side of the main channel, south-westward of Noedjalalei. There are two large trees which appear as one from a distance, on Tegawa gedang. The reefs extending from the southern end of Noedjalalei and the south-eastern end of Tegawa gedang narrow the channel to a width of about 2½ cables.

The passage between Tegawa islets and the north-eastern side of Tanah Bala, although deep and clear of dangers in mid-channel, is not recommended, on account of the reef which extends into the channel from the north-western side of Tegawa kechil, and a detached reef

Charts 2779, 2760, 748b.

Chart 3855, plan of Tanah Bala strait.

lying close under the Tanah Bala shore, about 4 cables north-westward of the islet. A 3½-fathom (6^{m}4) patch lies about 2 cables from the western shore, about 1¼ miles south-south-eastward of Tegawa gedang.

Noedjambolo (Nujambolo), a low islet, covered with coconut palms, lies in the middle of the southern entrance to Straat Tanah Bala, about 8 cables westward of Tanjong Seiro (page 319); a reef extends about 2 cables from its southern side.

A reef, with a depth of 3 feet (0^{m}9), lies close to the shore reef of Tanah Masa, 1¼ miles northward of Noedjambolo, and is not marked by discolouration. A 2-fathom (3^{m}7) patch lies 5½ cables northward of Noedjambolo, and is marked by discolouration under favourable conditions. About 3 cables north-westward of the patch is a reef, which can be always distinguished by discolouration.

Tofo and Simakonde are islets, each lying on a detached reef about one mile north-westward and 1½ miles west-south-westward, respectively, of Noedjambolo, and close off the coast of Tanah Bala. Small craft may obtain good anchorage westward of Simakonde.

Tidal streams.—The tidal streams turn at about high and low water by the shore, the flood stream setting south-eastward and the ebb north-westward, at a rate of from one to 2 knots.

Directions.—On entering Straat Tanah Bala from southward a vessel should keep the eastern edge of Tegawa gedang in line with Hill A, bearing 330° (*see* view on chart 3855), which leads between Tanjong Seiro and Noedjambolo; when the two low islets lying on the reef on the northern side of the bay, about 1½ miles north-westward of Noedjambolo, bear 247°, she should steer for the western edge of Noedjalalei, passing in mid-channel between that island and Tegawa islets, and thence she should be guided by the chart, the northern end of the strait, presenting no difficulties.

Chart 3854.

Tanah Bala.—Tanah Bala is 886 feet (270^{m}0) high in the northern part, its summit appearing in the shape of a pyramid from the east and north-westward; it is not visible from the northern part of Straat Tanah Bala. The whole land is densely wooded, and, except for a few places on the east coast, is uninhabited.

Charts 3855, plan of Tanah Bala strait, 3854.

Western side of Tanah Bala.—Dangers.—The western side of the island is mostly low without any noticeable features, except the hill, 226 feet (68^{m}9) high, on Tanjong Hatik, the densely wooded western extremity of the island, which, from northward, appears to be an island, and a hill close eastward of Tanjong Boh (*Lat. 0° 21′ S., Long. 98° 23′ E.*), situated 6 miles south-south-westward of Tanjong Pasalahang.

Makole, an island about 2 miles south-westward of Tanjong Pasalahang, has a conical hill, 226 feet (68^{m}9) high, at its northern end, and a noticeable tree about 3 cables from its southern end. It is fringed by a reef, on which there are two large boulders off the northern side. It should not be approached within a depth of 10 fathoms (18^{m}3).

Two islets lie 2¾ miles north-westward of the northern extremity of Makole, on a reef, at the southern end of which there is a depth of 2¾ fathoms (5^{m}0). Between it and Makole there is a 5-fathom (9^{m}1) patch.

A reef, with a depth of 3¾ fathoms (6^{m}9), lies 6½ cables north-east-

Charts 2779, 2760, 748b.

Charts 3855, plan of Tanah Bala strait, 3854.

ward of the northern extremity of Makole; a one-fathom ($1^{m}8$) patch lies 5½ cables south-eastward of the southern point of Makole.

Chart 3854.

In the bight between Tanjong Pasalahang and Barogang, an islet connected to the western side of Tanah Bala by a reef, 3¾ miles southward, there is a reef which dries, and on which the sea always breaks, lying about 4 cables offshore 1¾ miles north-eastward of the islet.

Southward of Barogang the coast is clear of dangers, except for a 2¾-fathom ($5^{m}0$) patch lying about 3 cables north-westward of Tanjong Tjekeh (Chekeh), a low point with high trees on it, about 2½ miles southward of Tanjong Boh. Tanjong Fopanoea, 2¼ miles north-eastward of Tanjong Hatik, is low, with a few trees on it. A reef extends about 3½ cables north-eastward from it.

Off-lying dangers.—A shoal, with a depth of 5½ fathoms ($10^{m}1$), and steep-to, lies about 8 miles westward of Tanjong Boh; it is occasionally marked by breakers and discolouration.

A shoal, with a least depth of 5 fathoms ($9^{m}1$), lies 2¼ miles north-north-westward of Tanjong Fopanoea; it is steep-to, and marked occasionally by the swell.

Anchorage.—An anchorage sheltered from westerly and south-westerly winds, may be obtained in the bay on the eastern side of Tanjong Fopanoea, in a depth of about 5½ fathoms ($10^{m}1$). A hill, 413 feet ($125^{m}9$) high, with a densely wooded summit, situated 3½ miles eastward of Tanjong Hatik, is a useful mark for approaching the anchorage.

Southern side of Tanah Bala.—Dangers.—Light.—Tanjong Itano Makinoe (Makinu), the southern extremity of Tanah Bala, is low with a reef extending about 3 cables southward. A bay, entered between this point and Tanjong Doeroe (Duru), 3¼ miles east-north-eastward, affords a sheltered anchorage in its north-western part, in depths of from 6 to 7 fathoms ($11^{m}0$ to $12^{m}8$). A rocky islet, covered with vegetation, fringed by a reef which dries, lies in the middle of the bay. There is a narrow cove lying between Tanjong Doeroe and Tanjong Nanaeh, which is the southern termination of a hilly promontory, but it affords no anchorage.

An 8-fathom ($14^{m}6$) patch lies about 1½ miles eastward of Tanjong Nanaeh.

Bodjo (Bojo) is a densely wooded island, 462 feet ($140^{m}8$) high, with a noticeable tree on its summit, and is fringed by a steep-to reef which nearly dries, extending about 3 cables offshore in places.

A light is exhibited, at an elevation of 359 feet ($109^{m}4$), from a white iron tower, 197 feet ($60^{m}0$) in height, close within the southern extremity of Bodjo (*Lat. 0° 39′ S., Long. 98° 31′ E.*).

There are no inhabitants, except the lighthouse keepers. There is a boat anchorage and boathouse on the north-eastern side of the island, whence a path leads to the lighthouse. The landing place may be approached by keeping the boathouse open northward of a small white beacon standing in the water close to it; the anchor should not be dropped in a depth of less than 30 fathoms ($54^{m}9$).

Van Bylandt riffen consist of two patches, with depths of from 2¾ to 3 fathoms ($5^{m}0$ to $5^{m}5$), situated on a bank, with depths of less than 10 fathoms ($18^{m}3$), coral, sand, and stones, the north-western patch lying about 7 miles north-eastward of Bodjo. The south-

Charts 2779, 2760, 748b.

Chart 3854.

western side of the bank is very steep-to, but the north-eastern side is more shelving. The shoalest parts may occasionally be distinguished by the swell, but seldom by breakers.

Eastern side of Tanah Bala.—Dangers.—The eastern coast is low. Bala, a hill, 748 feet ($228^{m}0$) high, about 8 miles from the southern point of the island, is the only conspicuous feature southward of Straat Tanah Bala.

Sigogolo, a hilly islet, difficult to identify, lies close offshore, 2½ miles north-north-eastward of Tanjong Nanaeh (*Lat. 0° 34′ S., Long. 98° 29′ E.*), the south-eastern extremity of Tanah Bala; its eastern side is clear of danger, but a reef extends about 2 cables north-westward from it.

Orasa, an island, 2 miles north-north-eastward of Sigogolo, and about three-quarters of a mile offshore, may be identified by its peculiar shaped trees; its eastern side is cliffy and steep-to. Two 3-fathom ($5^{m}5$) patches lie about 7 cables south-south-westward and 4 cables west-south-westward, respectively, of the southern extremity of Orasa. Between Sigogolo and Orasa there is a bay, in which anchorage may be obtained off Loeaha Siboeha (Luaha Sibuha) village, situated at its head.

Noedjagia (Nujagia) and Hibau are islets covered with coconut palms lying on reefs which extend about one mile from the eastern side of Tanah Bala, southward of the southern entrance to Straat Tanah Bala. There is no navigable channel between these reefs and the coast.

Eastern side of Tanah Masa.—Coast.—The eastern coast of Tanah Masa is low, densely wooded, and nearly everywhere overgrown with mangrove. Between this coast and Pini there are many islands and reefs, and there is always a smooth sea.

Chart 3855, plan of Channels off the north-east coast of Tanah Masa.

Off-lying islands and dangers.—Beacon.—Adam is an islet, covered with tall coconut palms, lying on the southern end of a reef, about 2½ miles south-eastward of Tanjong Batoe Wawa (page 309).

Ladjohene (Lajohene) is an islet lying on the south-western side of a reef, 2¾ miles south-south-eastward of Tanjong Batoe Wawa and about 2½ cables offshore, with a channel, in which there is a depth of 6 fathoms ($11^{m}0$), between.

Boenidjoega (Bunijuga), a sand cay covered with vegetation, lies on the southern end of a reef, about 2¼ miles south-eastward of Ladjohene, and about one mile offshore.

Masa, an uninhabited island fringed by a reef, lying about 4¾ miles south-eastward of Tanjong Batoe Wawa, is hilly, with a few tall trees at its southern end, one of which, being fan-shaped, is noticeable. The sand cay about 4 cables southward of the southern extremity of the island, lies in the middle of a reef, and dries.

Bai, 1¼ miles eastward of Masa, with a deep channel between, is a low island, fringed by a reef, and has a noticeable tree on its northern part, visible a considerable distance from the north-westward, northward, and eastward. There is a village with a mosque with a zinc roof on the western side of the island. There is a pier, with a depth of 5 feet ($1^{m}5$) alongside, near the village.

A beacon, surmounted by a cone, stands on a one-fathom ($1^{m}8$) patch, situated about 2¼ miles northward of Bai.

Charts 2779, 2760, 748b.

Chart 3854.

Reefs, the positions of which can best be seen on the chart, lie within 7½ miles north-eastward and 11 miles eastward of Bai. *See* also on page 321.

Treba besar and Treba kechil are islets, lying about 3¼ miles eastward and 4¼ miles south-eastward, respectively, of the southern extremity of Bai. Treba besar is bare, and Treba kechil has several coconut palms on it.

Chart 3855, plan of Channels off the north-east coast of Tanah Masa.

Fatilasa (*Lat. 0° 07′ S., Long. 98° 28′ E.*), an island covered with mangroves, lying about 2¼ miles southward of Boenidjoega, is separated from Tanah Masa by a narrow channel, navigable only by boats; the southern entrance to this channel nearly dries.

Mahang, separated from Fatilasa by a passage about 2¼ cables wide, is fringed by reef except on its western side. There is a small village on its south-western side. On the northern side of the island there is a noticeable white beach and some coconut palms.

Small craft with local knowledge can obtain anchorage in mid-channel between Mahang and Fatilasa. There is a 1½-fathom ($2^{m}7$) patch in the middle of the southern entrance to the channel.

Katadok and Lalibo are islets covered with coconut palms, each lying on the western side of a detached reef, about one mile east-north-eastward and 1½ miles south-eastward, respectively, of the northern extremity of Mahang. There is a large noticeable tree on Lalibo. About midway between Katadok and Lalibo is a reef on which there is a sand cay awash.

Chart 3854.

Penang, about 1¼ miles southward of Lalibo, is an island fringed by reef, and may be identified by its peculiarly shaped trees. There is a deep channel off its western side which is only navigable with the sun in a favourable position for seeing the reefs.

A rock, with a depth of less than 6 feet ($1^{m}8$), lies three-quarters of a mile eastward of the south-eastern extremity of Penang.

Tjipanana (Chipanana) kechil, a sand cay covered with vegetation, and Tjipanana (Chipanana) besar, an islet covered with coconut palms, lie on the western edge of separate detached reefs, about 3½ and 4½ miles, respectively, south-south-eastward of Fatilasa. Trega, a sand cay covered with vegetation, lies on the north-western edge of a reef, 3¾ miles eastward of Tjipanana kechil.

Tetedono, lying close to Tanah Masa, 2¼ miles southward of Tjipanana besar, is a hilly and densely overgrown island difficult to identify. It is connected to the coast by a reef which dries.

Small craft with local knowledge obtain a sheltered anchorage off its south-western side, but it can only be approached when the reefs in the vicinity can be distinguished.

Chart 3855, plan of Channels off the north-east coast of Tanah Masa.

Anchorage.—Anchorage may be obtained, in a depth of about 14 fathoms ($25^{m}6$), well sheltered, about half a mile westward of the mosque on Bai. Vessels should not close the coast within the 10-fathom ($18^{m}3$) line.

Chart 3854.

Coast.—Tanjong Andjing (Anjing) lies about 7 miles northward of Tanjong Seiro (page 319). Two reefs, of which the southern is always marked by breakers, lie about 2½ miles eastward of Tanjong Andjing.

Charts 2779, 2760, 748b.

Chart 3854.

The coast between Tanjong Andjing and Tanjong Seiro is fringed by a reef which extends 1¼ miles offshore. About 2¾ miles southward of Tanjong Andjing, on the coastal reef, is Karang Andjing (Anjing), a low wooded island, which may be identified by a noticeable white beach.

Between Karang Andjing and Tanjong Seiro there is a bay, at the head of which a rivulet discharges, but it dries at its mouth. South-eastward of the mouth there is an indentation in the coastal reef, in which small craft with local knowledge may obtain anchorage, in a depth of about 5½ fathoms ($10^{\mathrm{m}}1$), but there is a detached reef in its entrance which is generally marked either by surf or by a swell.

Anchorage may be obtained in the bay, in a depth of about 20 fathoms ($36^{\mathrm{m}}6$), with the south-eastern extremity of Karang Andjing bearing 035°, and the mouth of the rivulet, 321°.

Tanjong Seiro (*Lat. 0° 24′ S., Long. 98° 33′ E.*) is low and wooded with tall trees. The summit of Tanah Bala is visible over the low isthmus northward of the point.

Chart 3855, plan of Channels off the north-east coast of Tanah Masa.

Directions.—A vessel approaching the north-western end of the channel between the north-east coast of Tanah Masa and the off-lying islands should steer with the western extremity of Boenidjoega in line with the eastern extremity of Fatilasa, bearing 153°, until the southern extremity of Adam is in line with the northern extremity of Masa, bearing about 098°, when she should keep Tanjong Batoe Wawa astern, bearing 310°, until the north-western extremity of Masa bears 054°, and then steer for the western extremity of Katadok, bearing 143°, until the village on the western side of Bai begins to open of the southern extremity of Masa, bearing about 050°; she should then alter course south-eastward and keep Boenidjoega astern, bearing 292°, until the southern extremity of Katadok is in line with the northern extremity of Mahang, bearing about 255°, and then keep the south-western extremity of Masa in line with Tanjong Batoe Wawa astern, bearing 310°, which will lead clear of all dangers.

Chart 3854.

Approaching from southward or south-eastward, the vessel should first make Tanjong Seiro and pass about 1½ miles off Karang Andjing, thence steer 000° and pass midway between the coastal reef off Tanjong Andjing and the two reefs eastward of it; when abreast of these, Treba kechil should have been sighted right ahead; she should then steer for it, bearing 000°, until Trega is in line with Tjapanana besar, bearing about 253°, when she should alter course north-westward and keep the south-western extremity of Masa in line with Tanjong Batoe Wawa, bearing 310°.

Charts 3855, plan of Channels off the north-east coast of Tanah Masa, 3854.

If it is intended to proceed through the channel between Masa and Bai, when the eastern extremity of Lalibo is in line with the western extremity of Penang, bearing 182°, the vessel should alter course northward and keep this alignment on astern until the mosque on Bai bears 090°, when she should steer 346° until Ladjohene is seen clear of the northern extremity of Masa, bearing about 257°, or with Treba besar, bearing 118°, open of the north-eastern extremity of Bai; then she should steer 000°, which will lead about half a mile westward of the beacon marking the one-fathom ($1^{\mathrm{m}}8$) reef 2¼ miles northward of Bai.

Charts 2779, 2760, 748b.

Chart 2779.

Pini.—Pini, the north-easternmost island of the Batoe group, has no distinguishing features; it is densely overgrown, sparsely populated, and has no navigable rivers.

Northern side of Pini.—The northern coast of Pini, except for a distance of 4½ miles westward of Tanjong Antimonang (*Lat. 0° 11′ N., Long. 98° 42′ E.*), the central point, is fringed by a reef which extends about 2 miles offshore near its western end. Tanjong Batoe Belobang, the western extremity of the island, is noticeable on account of some holes in its rocky face. Westward of Tanjong Antimonang are some high trees visible a considerable distance. Landing is difficult in most places on account of the mangrove.

Off-lying dangers.—A 4½-fathom (8^{m}2) patch, and a 4-fathom (7^{m}3) patch lie about 15½ and 7½ miles, respectively, northward of Tanjong Batoe Belobang, and between the latter patch and the point there are several other reefs, with depths of from 4 to 5 fathoms (7^{m}3 to 9^{m}1). A 3-fathom (5^{m}5) patch lies about 3½ miles northward of Tanjong Batoe Batoe (Batu Batu), situated about 6 miles north-eastward of Tanjong Batoe Belobang.

Chart 3854.

Detached shoals, with depths of from 3¾ to 5 fathoms (6^{m}9 to 9^{m}1), lie outside the 10-fathom (18^{m}3) line off the north-western end of Pini.

Chart 2779.

Two reefs, with depths of 2 and 4 fathoms (3^{m}7 and 7^{m}3), lie about 3 and 4¼ miles, respectively, north-eastward of Tanjong Batoe Batoe, and a rock, which dries, lies about 2 miles north-north-westward of Tanjong Antimonang. Laoet (Laut), with a depth of 2 fathoms (3^{m}7), and difficult to distinguish, lies about 6 miles northward of Tanjong Antimonang. Liat Batoe (Batu), with a depth of 2¼ fathoms (4^{m}1), lies about 4½ miles northward of Tanjong Simanoesoe (Simanusu), the north-eastern extremity of Pini, with a 4-fathom (7^{m}3) patch between them. A reef, with a least depth of 3 fathoms (5^{m}5), lies 5 miles east-north-eastward of Tanjong Simanoesoe, with a 4½-fathom (8^{m}2) patch between them.

Chart 3854.

Western and southern sides of Pini.—Dangers.—Beacon.—A rock, with a depth of less than 6 feet (1^{m}8), and a 2½-fathom (4^{m}6) patch lie 1½ miles west-north-westward and about three-quarters of a mile westward, respectively, of Tanjong Batoe Belobang. Two 3-fathom (5^{m}5) patches lie about one mile south-westward, and one mile south-south-westward of the same point.

A 2¾-fathom (5^{m}0) patch lies about three-quarters of a mile southward of Tanjong Rima, situated about 3½ miles south-south-eastward of Tanjong Batoe Belobang.

About 1½ miles eastward of Tanjong Rima is Tanjong Kajoe (Kayu) Arau, from which a reef of the same name, which dries and is generally marked by breakers, extends about 1¼ miles southward. Between Tanjong Kajoe Arau and Tanjong Besar, about 9½ miles eastward, the coast is fringed by reefs for the greater part. Tanjong Besar is rocky, and may be identified by a reddish brown patch on it.

Masin, a low island covered with coconut palms and fringed by a reef, which extends about one mile southward, lies about 3¼ miles east-south-eastward of Tanjong Kajoe Arau. On it is a noticeable tree, which is especially so when seen from eastward or westward. The

Charts 2760, 748b.

Chart 3854.

outer end of the reef is marked by a black beacon surmounted by a cone. On either side of the reef is a detached reef which dries.

Laboean Hijoe village, with a conspicuous mosque, is situated about 2½ miles westward of Tanjong Besar. Vessels may obtain anchorage off the village, in a depth of about 11 fathoms (20^{m}1), but it is reported that the depths shown on the chart cannot be relied on in this vicinity.

Chart 2779.

Between Tanjong Besar (*Lat. 0° 04′ N., Long. 98° 44′ E.*) and Tanjong Bakau, about 2½ miles east-north-eastward, the coast is fringed by a reef which extends about three-quarters of a mile offshore. Thence to Tanjong Laboean Badjau (Labuan Bajau), about 3½ miles eastward, there is a bay with two bights separated by Tanjong Kapo, close eastward of which is Kapo village, off which vessels with local knowledge may obtain anchorage, in a depth of about 11 fathoms (20^{m}1), but it is reported that the depths shown on the chart here cannot be relied on. On Tanjong Laboean Badjau are some high trees, which renders it more conspicuous than Tanjong Pasingarang, the south-eastern extremity of the island, which from a distance has the appearance of a small low island. Between Tanjong Laboean Badjau and Tanjong Pasingarang, the coast is fringed by a reef, which extends about three-quarters of a mile offshore, and nearly one mile south-eastward and eastward from the latter point.

Chart 3854.

Off-lying islets and dangers.—Beacon.—Several islets and a large number of reefs lie off the southern side of Pini, the positions of which may best be seen on the chart.

Within 3½ miles southward of Masin are Kasi, Pasakek kechil, and Pasakek besar, low wooded islets, fringed by reef, lying at the north-eastern end of the mass of reefs extending north-eastward from Bai, *see* page 317.

Montrado, a reef, which dries, and is marked by breakers, is steep-to and lies 8¼ miles southward of Tanjong Besar. A 4½-fathom (8^{m}2) patch lies 3½ miles eastward of the reef. Vessels should not pass south-westward of the line joining Montrado and the north-eastern end of the mass of reefs extending north-eastward from Bai.

Chart 2779.

Tonga, a reef on which there is a sandbank which dries, lies about 2½ miles south-south-eastward of Tanjong Besar. Between Montrado and Tonga and also within 3¾ miles south-eastward of Tonga there are several reefs, one of which dries, the positions of which may best be seen on the chart.

Oedjoeng Bakau, a reef with a depth of 1½ fathoms (2^{m}7), lies about 1¾ miles southward of Tanjong Bakau. Close northward of this reef is a 1¾-fathom (3^{m}2) patch, marked by a white beacon surmounted by a ball. These reefs and others farther southward are marked by discolouration, and those which dry are usually marked by surf or by the swell. A detached reef, which dries, lies nearly one mile southward of Tanjong Pasingarang. A 3-fathom (5^{m}5) patch lies about 2¼ miles south-south-westward of the point, and two 5-fathom (9^{m}1) patches lie about 1½ and 2 miles, respectively, southward of the point.

Eastern side of Pini.—Coast.—The eastern coast of Pini is low and fringed by reef, which extends in places about 1¼ miles offshore. About 1¾ miles northward of Tanjong Pasingarang is Tanjong Feiboe,

Charts 2760, 748b.

Chart 2779.

about 3½ cables northward of which is Bakau, an islet, difficult to distinguish, lying on the coastal reef.

Off-lying islets and dangers.—A reef, which dries, lies 3 miles north-eastward of Tanjong Feiboe, with several reefs between. Oelar, a low islet, covered with high coconut palms, lies 2½ miles eastward of Tanjong Pasingarang, with a 2¼-fathom (4^m1) patch between.

Karang Oelar (Ular), a reef with a depth of about one foot (0^m3), lies about 3¾ miles east-north-eastward of Oelar. It is usually difficult to distinguish. Gosong Oelar (Ular), a reef, with a sandbank which dries on it, lies about one mile southward of Karang Oelar, with other reefs between.

Samboelaling (Sambulaling), a low islet with high coconut palms and fringed by a reef, lies about 3 miles south-eastward of Oelar. Karang Samboelaling (Sambulaling), about 1½ miles east-north-eastward of Samboelaling, is nearly always marked by breakers. There are many shoals between Samboelaling and Oelar, and there is a reef, which dries, about 1¼ miles south-eastward of Samboelaling.

Anso (*Lat. 0° 00′, Long. 98° 56′ E.*), a low islet covered with high coconut palms and fringed by a reef, lies about one mile southward of Samboelaling. About 1¼ miles southward of Anso, is Karang Anso, on which the sea breaks, with several reefs between them. About 2 miles westward of Anso is a 3-fathom (5^m5) patch, which does not show by discolouration, and about 4¼ miles south-south-westward of the same islet is a reef, with a depth of 2½ fathoms (4^m6), marked by discolouration, and other reefs between.

Directions.—A vessel proceeding from Baai van Ajerbangis (page 307) to Poeloe Tello should pass northward of Pini, keeping northward of Laoet (page 320) as the area southward of it is much encumbered with reefs. When Tanjong Batoe Belobang bears 170°, she may steer either for Memong or approach Tello along the northern side of Tanah Masa, as described on page 312.

Vessels with local knowledge approaching the eastern end of Pini from the coast of Sumatra and bound for Poeloe Tello, proceed along the southern side of that island, where the sea is always smooth, by passing northward and westward of Oelar, thence steering south-westward to within one mile of Montrado, then north-westward, passing between the reef extending southward of Masin and Kasi, and thence westward. Or, with good visibility they may shorten the route by keeping Anso astern, bearing 090°, and pass northward of Tonga, and thence between Masin and Kasi, as described above.

Charts 2760, 748b.

CHAPTER IX

SUMATRA, WEST COAST—AJERBANGIS TO STRAAT SOENDA AND OFF-LYING ISLANDS

Chart 2779.

COAST.—The coast between Ajerbangis and Padang, about 90 miles south-eastward, is generally flat.

About 21 miles south-eastward of Ujong Sawang Poeding (page 306) is the entrance to the Pasaman rivier, on the eastern side of which is a small jetty, with a depth of 13 feet ($4^{m}0$) at its head. Close southward of the jetty there is a training wall about 200 feet ($61^{m}0$) long, to prevent silting near the jetty. There is a crane with a lifting capacity of 5 tons on the jetty. Kapar rivier discharges into the eastern side of the mouth of Pasaman rivier, and on its southern bank close within its entrance is the village of Sasak, which may be identified at a distance by a white mosque.

A vessel entering Pasaman rivier should keep closer to the western bank, as a sandbank extends a considerable distance from the eastern bank. There is probably a bar at the entrance which will limit the draught of a vessel entering to 4 or 5 feet ($1^{m}2$ or $1^{m}5$).

Chart 709.

About 1¼ miles south-eastward of Ujong Katiagan (*Lat. 0° 09′ S., Long. 99° 45′ E.*), situated 28 miles south-eastward of Ujong Sawang Poeding, there is a steep rocky hill, 128 feet ($39^{m}0$) high. Katiagan village stands on the southern side of the mouth of Sungei Masang, which discharges at the point, and has a shallow bar.

About 7½ miles southward of Ujong Katiagan is Ujong Karang, on which are some high trees, visible a considerable distance. About 2½ miles farther southward is Ujong Masang, a low point, at which Sungei Masang Kiri discharges. Within 5 miles of Ujong Masang are four hills :—Masang, 735 feet ($224^{m}0$) high, with a flat summit, is the highest and easternmost ; Antokan, 568 feet ($173^{m}1$), the southernmost ; Laboean (Labuan), 479 feet ($146^{m}0$), and Pandji, 338 feet ($103^{m}0$), the northernmost, are cone-shaped. *See* view facing page 324.

Chart 2779.

Talamau, 9,554 feet ($2912^{m}1$) high, and cone-shaped, lies 19½ miles north-eastward of Ujong Katiagan. Pasaman, 2½ miles south-westward of Talamau, is 7,185 feet ($2190^{m}0$) high.

Talamau, bearing 049°, distant 35 miles.

(*Original dated* 1929.)

Charts 2760, 748b.

Chart 2779.

Local weather.—*See* page 28.

Chart 3852, plan of Tiku road.

Reede Tikoe. Islets and dangers.—Light.—Reede Tikoe (Tiku), situated about 9 miles south-eastward of Ujong Masang, is an open anchorage southward of the town of Tikoe (Tiku), but partially protected by the low off-lying islets ; a heavy sea, however, sets into the roadstead with north-westerly and south-westerly winds. Tapi peninsula, formerly an island, is now joined to the mainland by a bare sand ridge, and is fringed by a reef on which the sea always breaks and which extends 3½ cables southward.

There are three off-lying islets extending in a south-south-westerly direction from Tapi peninsula, named respectively, from northward, Karsik, Tangah, and Oedjoeng (Ujong) ; the first is a barren sand cay, and the other two are covered with high coconut palms ; all are fringed by reef.

A light is exhibited, at an elevation of 44 feet ($13^{m}4$), from a white iron framework structure, 46 feet ($14^{m}0$) in height, on the south-western side of Oedjoeng.

A reef, which dries, lies in the fairway between Oedjoeng and Tangah ; it is steep-to and marked by discolouration. A reef, which dries, lies 1¾ cables northward of Tangah.

Oedjoeng light is observed over the islets and dangers northward of Oedjoeng.

The town of Tikoe stands within Tapi peninsula at the mouth of Sungei Tikoe, which discharges north or south of the peninsula according to the season.

Landing may be effected north-westward or south-eastward of the peninsula according to the direction of the wind.

Anchorage.—Directions.—The best anchorage is in a depth of from 7 to 8 fathoms ($12^{m}8$ to $14^{m}6$), clay, under the lee of Oedjoeng. Small craft may obtain anchorage, in a depth of about 3 fathoms ($5^{m}5$), eastward of the reef which extends southward from Tapi peninsula.

Southward of the parallel of Tikoe there are numerous sunken reefs extending as far out as the 100-fathom ($182^{m}9$) line. In order to avoid these dangers Tikoe should be approached with Oedjoeng light structure bearing more than 090°, passing southward of it and thence to the anchorage.

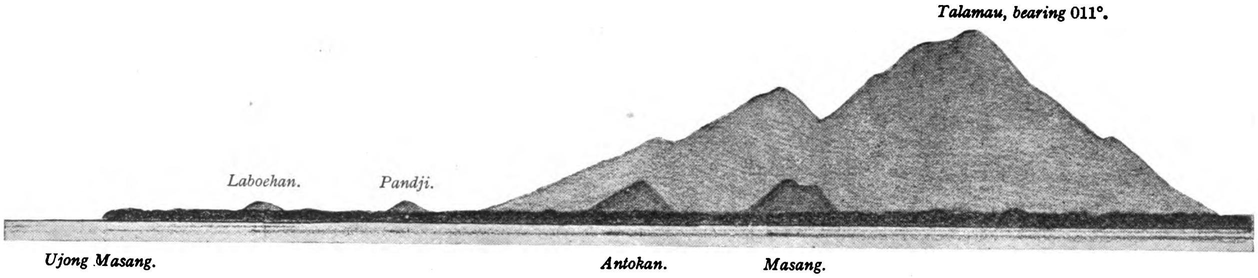
Chart 709.

Coast.—The coast between Tapi peninsula and Priaman, about 18 miles south-eastward, is generally low. Farther inland there are some useful marks. Tiga (*Lat. 0° 30′ S., Long. 100° 13′ E.*), 1,621 feet ($494^{m}1$) high, and Soelasih (Sulasi), 650 feet ($198^{m}1$), lie about 10 miles north-eastward and 8 miles east-north-eastward, respectively, of Priaman. The former has three hummocks, of which the two northern are of equal elevation, the southern being lower. From southward it has the appearance of a moderately low hill with a small peak at either end. Soelasih is conical with light yellow streaks. Singgalang, 9,439 feet ($2877^{m}0$) high, lies 8½ miles north-eastward of Tiga ; Marapi (Merapi), 9,488 feet ($2891^{m}9$) high, lies about 7 miles eastward of Singgalang, and is said by the Malays to be the peak on which the Ark rested. *See* view on chart 709, and facing this page.

The coastal region between Tikoe and Padang is densely populated,

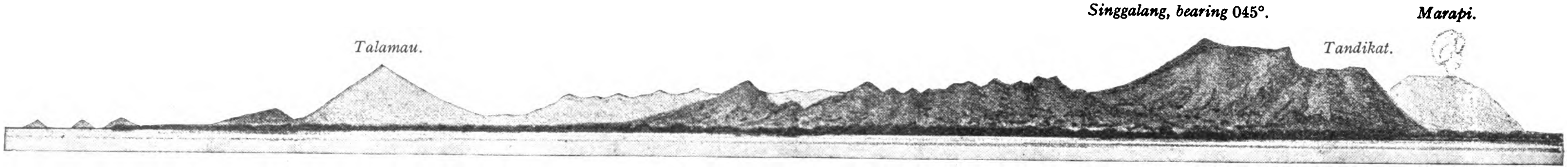
Charts 2760, 748b.

To face page 324.



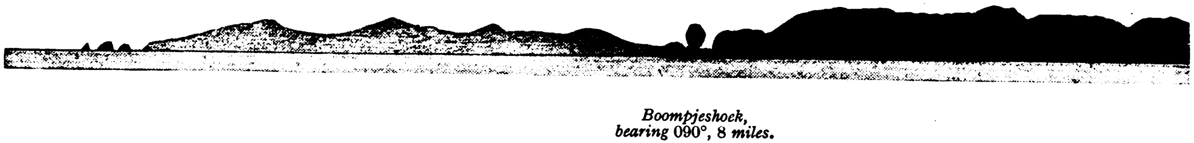
Southern approach to Reede Tikoe.

(*Original dated* 1902.)



South-western approach to Reede Priaman.

(*Original dated* 1902.)



Straat Siberoet, southern shore.

(*Original dated* 1902.)

Chart 709.

but northward of Tikoe there are few inhabitants. Between Tapi peninsula and Priaman, a deep channel lies between the 6-fathom ($11^{m}0$) line and several reefs situated outside the 10-fathom ($18^{m}3$) line. Gosong riffen, part of which dries, lies inside the 6-fathom ($11^{m}0$) line, 5 miles south-eastward of Oedjoeng and about 1¼ miles offshore.

Off-lying dangers.—Ingaris, a reef with a depth of 1½ fathoms ($2^{m}7$), on which the sea breaks, and steep-to, lies about 4¼ miles south-westward of Oedjoeng. About 1¼ miles east-north-eastward of Ingaris is Bajang (Bayang), a reef with a depth of 7 fathoms ($12^{m}8$).

Seroentjing (Serunching) besar, with a depth of 1½ fathoms ($2^{m}7$), and steep-to, lies 6¼ miles south-south-eastward of Oedjoeng, and 4½ miles offshore; it shows by discolouration and the sea often breaks on it. Seroentjing (Serunching) kechil, with a depth of 5 fathoms ($9^{m}1$) and steep-to, lies three-quarters of a mile southward of Seroentjing besar. Batik besar, with a depth of 1¼ fathoms ($2^{m}3$), and on which the sea occasionally breaks, lies about three-quarters of a mile west-south-westward of Seroentjing kechil. Batik kechil, with a depth of 4¼ fathoms ($7^{m}8$), lies 3½ cables south-eastward of Batik besar; these reefs are both steep-to.

Soengai (Sungi) Bamban, a reef with a depth of one fathom ($1^{m}8$), and on which the sea often breaks, lies about 2¾ miles eastward of Batik kechil and 4 miles offshore. Soengai (Sungi) Limau, a reef with a depth of 4½ fathoms ($8^{m}2$), and which seldom shows by discolouration, lies about 1½ miles south-south-eastward of Soengai Bamban.

Chart 3852, plan of Priaman road.

Reede Priaman.—Islets and dangers.—Light.—Reede Priaman, situated off the town of the same name, affords a sheltered anchorage from north-westerly and westerly winds, under the lee of the off-lying islets south-westward of the town. *See* view facing page 324.

Karsik, an islet fringed by a reef, lies about 3¼ miles north-westward of the town and 1¾ miles offshore; it is covered with trees and has a sandy beach.

Anso, Tangah, and Oedjoeng (Ujung) are low and wooded islets each fringed by a reef, lying parallel with the coast westward and south-westward of Priaman. From the south-western side of Anso the reef extends about 1½ cables.

A light is exhibited, at an elevation of 103 feet ($31^{m}4$), from a white iron framework structure, 102 feet ($31^{m}1$) in height, on Karsik.

Doerian (Durian) (*Lat. 0° 37′ S., Long. 100° 01′ E.*), a reef with a depth of 2½ fathoms ($4^{m}6$), lies 3¾ miles south-westward of Karsik. Between Doerian and the coast, and within a radius of 2½ miles from the former, are four steep-to patches; Kandoe Poeloe (Kandu Pulu), with a depth of 1¼ fathoms ($2^{m}3$), is the northernmost; Sipakal and Kajoe Poetih (Kayu Puti), each with a depth of 1¾ fathoms ($3^{m}2$), lie 4 cables and one mile, respectively, southward of Kandoe Poeloe; Kenali, with a depth of 1¼ fathoms ($2^{m}3$), lies 2½ miles eastward of Doerian. The sea often breaks on Kajoe Poetih.

Karang Sapoeloe (Sapulu), with a depth of 4¼ fathoms ($7^{m}8$), and steep-to, lies 6½ cables north-westward of Anso; it is not marked by discolouration.

Sibarat, a reef which dries, lies about 5½ cables south-westward of Oedjoeng, with deep water between.

Close off the mouth of the Batang Priaman Gadang are two reefs,

Charts 2779, 2760, 748b.

Chart 3852, plan of Priaman road.

which always show; about half a mile north-westward of the northern of these two reefs is a reef which dries, and about the same distance south-eastward of the inner end of the southern reef, is a 3-foot (0^m9) patch lying a quarter of a mile offshore.

The town of Priaman stands on the southern side of the mouth of the Batang Priaman Gadang, the entrance to which is so shallow that a boat cannot enter until near high water; trade is much restricted in consequence.

Priaman, which is the headquarters of an Administrator, is connected to the railway system.

Anchorage.—Directions.—Anchorage may be obtained eastward of Tangah or of Oedjoeng, in depths of from 3 to 7 fathoms (5^m5 to 12^m8).

A vessel approaching Reede Priaman from Tikoe, should steer for Karsik, bearing 135°, or with Oedjoeng astern, bearing 315°; she should pass between Karsik and the reefs south-westward of it, thence westward of Karang Sapoeloe, thence between Anso and Tangah, to the anchorage. An alternative route is to pass westward of Doerian and the other dangers off Priaman and approach the roadstead from westward.

Chart 709.

Approaching from Emma haven (page **331**), after rounding Pisang in its northern approach, she may steer for Oedjoeng and follow the deep channel inside the reefs, *see* page 328.

Chart 2779.

STRAAT SIBEROET.—Straat Siberoet (Siberut), between Bodjo (Bojo), situated 1½ miles southward of Tanjong Nanaeh (*Lat. 0° 35′ S., Long. 98° 29′ E.*), the south-eastern extremity of Tanah Bala, and the northern end of Siberoet, is about 22 miles wide, and is the passage usually taken by steam vessels bound to Emma haven from northward. Low powered steam vessels from the Indian ocean bound to Straat Soenda between May and September, and all vessels bound northward between November and March use this passage.

There is generally a long line of surf on the shores of the strait, particularly in its northern and western portions. In the eastern portion, and under the Siberoet shore, there is shelter from the sea which causes heavy surf on the northern shore, where all the dangers lie within the 3-fathom (5^m5) line.

Tidal streams.—The tidal streams are irregular and depend on the prevailing wind. Sometimes a westerly set is experienced for several successive days; at other times, an easterly set, the latter being generally the weaker. After a few days of light winds the streams turn at about high and low water. The strongest streams are found close to the shores, where, northward of Tanjong Sigep, the northern extremity of Siberoet, and between Bodjo and Tanah Bala, they sometimes attain a rate of from 2 to 3 knots. In the latter vicinity the flood stream sets east-north-east and the ebb, west-south-west.

Chart 3854.

Northern side of Straat Siberoet.—The northern side of Straat Siberoet is described with the southern side of Tanah Bala on page **316**.

Chart 2779.

Southern side of Straat Siberoet.—The northern coast of Siberoet,

Chart 2779.

which forms the southern side of Straat Siberoet, is low, sandy, and covered with high trees. The coast rises gradually to a range of hills, of which the peaks are not easily identified; the highest is a cone, with an elevation of 1,332 feet ($406^{m}0$), 13½ miles southward of Boompjeshoek (Boompyeshuk) or Tanjong Amongoroen (*Lat. 0° 57′ S., Long. 98° 42′ E.*), the north-western extremity of the island. *See* view facing page 324. Westward of this point the hills approach the coast.

Boompjeshoek is a double point with a conspicuous white rock on the western head; on the eastern head is a conical hillock, on which is a conspicuous tree. Between the two heads there is a sandy beach. The point is very prominent from southward.

About 3½ miles eastward of the eastern head of Boompjeshoek is Tanjong Simabai, on which are some high trees, which, from a distance, gives the point the appearance of being cliffy. About 3¼ miles farther eastward is Tanjong Sileoe (Sileu), noticeable on account of its casuarina trees. The shallow ridges within the 10-fathom ($18^{m}3$) line along the north coast of Siberoet consist of sand and stones. Sungei Moearasigep discharges 2½ miles south-westward of Tanjong Sigep, and is navigable by boats for a short distance. Moearasigep village is situated at the mouth of the river. Tanjong Sigep is low and densely wooded. *See* view facing page 324. From north-westward it appears to be an island.

Dangers.—Makasser (Macassar) rif, over which there is a least depth of 2 feet ($0^{m}6$), lies about 10 miles north-north-westward of Boompjeshoek, and near the western edge of a bank which extends northward from the northern end of Siberoet to a position north-eastward of Bodjo. The reef is easily distinguished in the daytime by the heavy breakers on its shallow portion; it extends one mile beyond the breakers.

Southward of the parallel 0° 43′ S., near the eastern edge of the bank extending northward from Siberoet are several reefs, marked by discolouration, with depths of from 3¼ to 6 fathoms ($5^{m}9$ to $11^{m}0$), the positions of which can be best seen on the chart. When the tidal stream is running these reefs are marked by overfalls, but not by breakers.

Directions.—Vessels proceeding through Straat Siberoet from seaward, by day or night, are recommended to pass between Van Bylandt riffen and the reefs south-south-eastward of them, where there is a deep passage about 8 miles wide. Tanjong Itano Makinoe should not be passed in a depth of less than 22 fathoms ($40^{m}2$).

DANGERS BETWEEN BATOE EILANDEN AND PRIAMAN.—The dangers lying northward of the parallel of Ujong Katiagan have been described on pages 306-307.

Fatahol Mobarak, with a depth of less than 6 feet ($1^{m}8$), lies 40 miles westward of Ujong Masang, and about 2 miles inside the 100-fathom ($182^{m}9$) line. A 2½-fathom ($4^{m}6$) patch lies about 2 miles north-westward of Fatahol Mobarak, with a 4¼-fathom ($7^{m}8$) patch between. A 1½-fathom ($2^{m}7$) patch and a 4½-fathom ($8^{m}2$) patch lie about 11½ miles westward, and 12½ miles north-westward, respectively, of Fatahol Mobarak.

Between Fatahol Mobarak and Priaman (*Lat. 0° 37′ S., Long. 100° 07′ E.*) there are numerous reefs, the principal of which are described

Charts 2760, 748b.

Chart 2779.

below; most of them lie within 2 miles of the 100-fathom (182^{m}9) line, and on some the sea occasionally breaks. Others may exist, and a constant look-out from aloft should be kept when in this vicinity.

Drakes, a reef, over which there is a depth of 3 feet (0^{m}9), lies about 7 miles east-south-eastward of Fatahol Mobarak; it is usually marked by breakers. A 5-fathom (9^{m}1) patch lies about 3¼ miles north-westward of Drakes and 7½ miles north-north-eastward is an 8-fathom (14^{m}6) patch.

West Pylades, consisting of three heads, lie from about 5 to 6 miles east-south-eastward of Drakes; the centre head, which dries, is marked by breakers, and the others have depths of from 1½ to 3¼ fathoms (2^{m}7 to 5^{m}9). Oost Pylades, consisting of two heads, lie about 5 miles east-south-eastward of West Pylades; the southern head, which has a depth of less than 6 feet (1^{m}8), is always marked by the swell, and sometimes by breakers. Between Oost Pylades and Kaning Sagi, a reef with a depth of 2 fathoms (3^{m}7), and on which the sea breaks, 18½ miles east-south-eastward, there are several reefs, with depths of from 2½ to 5½ fathoms (4^{m}6 to 10^{m}1), the positions of which can best be seen on the chart.

Chart 709.

Shoals, with depths of from 3¼ to 6 fathoms (5^{m}9 to 11^{m}0), lie three-quarters of a mile southward of Kaning Sagi and other shoals within 2 miles south-eastward of it.

Haai riffen (Hai) or Karang Doea, about 5 miles north-eastward of Kaning Sagi, consist of two steep-to heads, about 2 miles apart, with deep water between them; there is a depth of 1½ fathoms (2^{m}7) over the north-western head, and 2½ fathoms (4^{m}6) over the south-eastern head; they are occasionally marked by breakers, but not by discolouration. There is a 3-fathom (5^{m}5) patch, which is occasionally marked by overfalls, lying about 2 miles west-north-westward of the north-western head.

Selita, a reef with a depth of 4 fathoms (7^{m}3) and steep-to, lies about 10½ miles south-south-westward of Oedjoeng (page 324), and close inside the 100-fathom (182^{m}9) line. Zuid Selita riffen consist of two heads which are steep-to, about 2¾ miles apart, east and west; the eastern head, with a depth of 7 fathoms (12^{m}8), lies about 1½ miles south-south-westward of Selita, and the western head has a depth of 3¾ fathoms (6^{m}9). Zuid Selita riffen lie from 1¼ to 2¼ miles outside the 100-fathom (182^{m}9) line.

Lawee, a reef with a depth of 4¼ fathoms (7^{m}8), and steep-to, lies about 7 miles south-eastward of Selita; a shoal, with a depth of 4¾ fathoms (8^{m}7), lies about 1½ miles north-westward of Lawee. Karang Bajang (Bayang), with a depth of 3 fathoms (5^{m}5), lies 3¾ miles south-eastward of Lawee, with a 3¾-fathom (6^{m}9) patch between.

COAST.—Between Priaman and Padang there is a deep channel between the coast and the reefs lying inside the 100-fathom (182^{m}9) line. Ujong Karang (*Lat. 0° 54′ S., Long. 100° 20′ E.*), 21½ miles south-eastward of Priaman, may be identified by Pangiloen (Pangilun), a long hill, with a noticeable summit, 302 feet (92^{m}0) high, lying about 1½ miles east-south-eastward of it. Batu Mandi, 259 feet (78^{m}9) high, lies 9½ miles northward of Ujong Karang, and Tjoebadak (Chub-

Chart 709.

adak), 1,598 feet ($487^{m}1$) high, lies 3¾ miles south-south-eastward of Batu Mandi, with several ridges between.

Batang Anai and Air Dingin discharge about 6½ miles north-north-westward and 2½ miles northward, respectively, of Ujong Karang, and Air Koerandji (Kuranji) discharges at the point.

Sao is a low islet covered with coconut palms, lying 3¾ miles north-north-westward of Ujong Karang, and about 1½ miles offshore. It is fringed by a reef which extends about one cable offshore in places. A reef, which dries, lies one mile west-south-westward of Sao, and is very difficult to distinguish.

A detached reef, which dries and on which the sea usually breaks, lies about half a mile westward of Ujong Karang.

Padang islands.—Light.—Dangers.—Bando, a low islet with high trees, is the north-westernmost of the group, and lies on a steep-to reef 11 miles south-westward of Priaman.

Piëh, an islet covered with high trees, lies 9 miles south-eastward of Bando; between them are several shoals, with depths of from 2 to 5 fathoms ($3^{m}7$ to $9^{m}1$), and deep water between them; the sea sometimes breaks on the shallower reefs.

Stort rif, with a depth of 2½ fathoms ($4^{m}6$), and steep to, lies 6½ miles west-south-westward of Piëh; it generally shows by discolouration.

Air, a low islet, covered with coconut palms, lies about 6 miles eastward of Piëh. A 1½-fathom ($2^{m}7$) patch, which is steep-to and on which the sea often breaks, lies between Air and Piëh; it is marked by discolouration. A rock, with a depth of 3 feet ($0^{m}9$), lies three-quarters of a mile south-eastward of Air.

Pandan, a low islet covered with coconut palms, lies 5 miles south-south-eastward of Piëh. Between them is an extensive reef, with a least depth of 1½ fathoms ($2^{m}7$), marked by discolouration. On the eastern side of the islet are the remains of a jetty, southward of which is a narrow channel through the shore reef giving access to the beach for boats at high water.

Siboentar (Sibuntar), a low islet covered with coconut palms, and fringed by a steep-to reef, lies 5¼ miles eastward of Pandan. On the north-western side of the islet there is an opening in the reef. Pasir, an islet similar to Siboentar, lies about a quarter of a mile eastward of it, and a 1½-fathom ($2^{m}7$) patch lies about 4 cables northward. Sipakal, a reef with a depth of one fathom ($1^{m}8$), and steep-to, lies 2 miles north-north-eastward of Pasir. Bindalang, a low islet, covered with coconut palms, and fringed by a steep-to reef, lies 4½ miles south-eastward of Pandan. Dorothea riffen, consisting of two heads, with depths of 3¼ and 2½ fathoms ($5^{m}9$ and $4^{m}6$), respectively, lies with the northern head 2¾ miles south-south-eastward of Pandan.

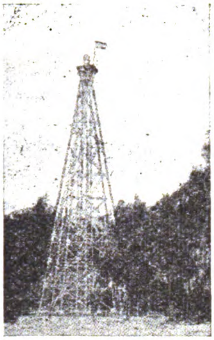
Toran (*Lat. 1° 02′ S., Long. 100° 10′ E.*), the southernmost of the Padang islands, lies 5¼ miles south-south-eastward of Pandan; it is fringed by a steep-to reef. A landing may be effected on the north-eastern side of the island.

A 1½-fathom ($2^{m}7$) patch, occasionally marked by breakers, lies 2½ miles east-north-eastward of Toran, and a one-fathom ($1^{m}8$) patch lies 1¾ miles farther in the same direction. A 3-fathom ($5^{m}5$) patch lies 3 miles east-south-eastward of the island.

Gosong Gedang, which dries and is steep-to, lies 5 miles eastward of Toran.

Charts 2779, 2760, 748b.

Chart 709.



Njamoek lighthouse.
(*Original dated* 1913.)

Islets and dangers in southern approach to Emma haven.—Light.—Njamoek (Nyamuk), a low sandy islet covered with coconut palms, and steep-to, lies 15½ miles south-south-eastward of Toran, and is the southernmost islet in the approach to Emma haven.

A light is exhibited, at an elevation of 100 feet ($30^{m}5$), from a white iron framework tower, 102 feet ($31^{m}1$) in height, on Njamoek.

Condor shoal, with a depth of 3½ fathoms ($6^{m}4$), lies about 3 miles north-north-westward of Njamoek.

Laoet (Laut), about 10½ miles north-westward of Njamoek, consists of four rocks, of which the easternmost is covered with vegetation, and has two sand patches which dry, northward of it. A reef of the same name, with a depth of 6 fathoms ($11^{m}0$), lies 3¾ miles east-south-eastward of the easternmost rock. Bellona, a reef with a depth of 3 fathoms ($5^{m}5$), lies about 3 miles north-eastward of Laoet.

Marak, an island 443 feet ($135^{m}0$) high, lies about 4 miles north-north-eastward of Njamoek; it is fringed by a reef on its eastern and southern sides. Siboentar, a wooded rock, lies on the edge of the reef extending from the southern extremity of the island. A 3-fathom ($5^{m}5$) patch lies about 2 cables from the north-western extremity of the island and a 2-fathom ($3^{m}7$) patch close southward of the south-western extremity. *See* view on chart 709.

Karang Anggo, Pagang, and Sirondjong are islets lying from about one to 3 miles north-north-eastward of Marak, and from 6½ to 2 cables from the mainland; these islets are steep-to. Bintanggor, 2¼ miles northward of Marak, is 394 feet ($120^{m}1$) high, but low towards its north-eastern extremity, where it is covered with coconut palms. *See* view on chart 709.

Gosong Bintanggor, with a depth of 3 feet ($0^{m}9$), and on which the sea breaks, lies about 2 miles westward of Bintanggor, with deep water between.

Sikowai, a high island, lies about one mile north-eastward of Bintanggor and about 3½ cables offshore. Sirandah, a low island covered with coconut palms, and fringed by a reef except on its eastern side, lies about 6 cables north-westward of Sikowai.

Chart 709, plan of Koninginne and Bungus bays.

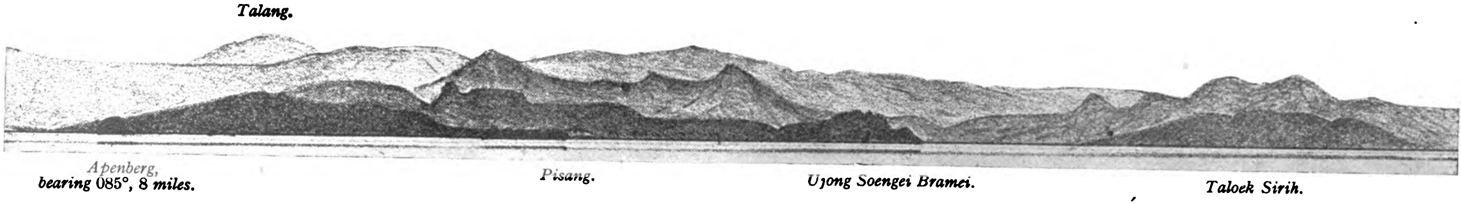
Sinjaroe (Sinyaru), a low islet covered with coconut palms, and fringed by a reef, lies about 3½ miles north-westward of Sirandah, and about midway between them is Gosong Sirandah, with a depth of 1¾ fathoms ($3^{m}2$).

Koningin Regentes, over which there is a depth of one fathom ($1^{m}8$), lies one mile north-eastward of Sinjaroe (*Lat. 1° 05′ S., Long. 100° 18′ E.*), and about one mile east-north-eastward of Koningin Regentes is Karang Bajang (Bayang), with a depth of 2¼ fathoms ($4^{m}1$).

The foregoing are the known dangers in the southern approach to Emma haven, but a careful look-out should be kept aloft in this vicinity, as others may exist. The dangers farther north-eastward are described on page 332.

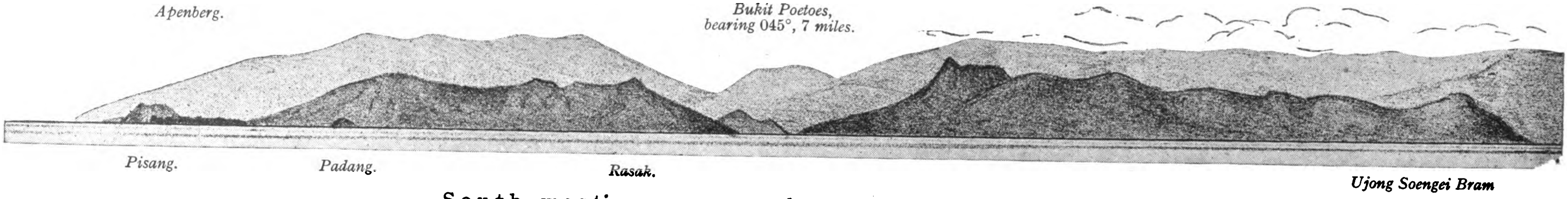
Charts 2779, 2760, 748b.

To face page 331.


Talang.
Apenberg,
bearing 085°, 8 miles.
Pisang.
Ujong Soengei Bramei.
Taloek Sirih.

Western approach to Koninginne baai.

(*Original dated* 1902.)



South-western approach to Koninginne baai.

(*Original dated* 1902.)

t 709, plan of Koninginne and Bungus bays.

Coast.—Beacon.—Apenberg, the southern entrance point of Batang Arau, is a bluff headland, 355 feet ($108^{m}2$) high, and thickly wooded, lying about 3½ miles southward of Ujong Karang; it may be identified by the white dwelling of the lighthouse keeper, and by the bold land southward of it; the coast northward of it is low, but far inland it is mountainous. Padang hill, 1,056 feet ($321^{m}9$) high, lies about 1¼ miles south-eastward of Apenberg. A flagstaff with a yard stands on the lower ridge in front of this hill. *See* views facing this page. For details of Batang Arau, *see* page 334.

About 8½ miles eastward of Apenberg is the Indaroeng factory, the chimney of which is noticeable. With Apenberg bearing more than 085° at night the glare of the factory lights can be seen.

Between Apenberg and Ujong Djoengoet Batoe (Jungut Batu) Pati, 2¾ miles southward the coast is fringed by a bank, with depths of less than 3 fathoms ($5^{m}5$), extending from half a mile to 1¼ miles offshore.

Chart 709, plan of Koninginne and Bungus bays.

Pisang, an islet fringed by reef except on its south-western side, lies 1½ miles south-south-westward of Apenberg, and one mile offshore; it is hilly, and has a landing pier on its eastern side, where the quarantine quarters are situated. Pisang kechil, eastward of Pisang, is connected to the coast eastward of it by a sunken rocky ridge.

A white stone beacon stands close within the southern extremity of Pisang.

Anchorage.—Anchorage may be obtained, in depths of from 5 to 6 fathoms ($9^{m}1$ to $11^{m}0$), about 4 cables eastward of the southern end of Pisang.

Chart 709.

Aspect.—Approaching from westward, the following mountains are noticeable:—Talang, 8,520 feet ($2596^{m}9$) high, about 20 miles eastward of Apenberg; it has three craters, one of which is extinct; Gadoet (Gadut), 6,099 feet ($1859^{m}0$) high, about 12 miles east-north-eastward of Apenberg; and Gantang, 4,495 feet ($1370^{m}1$) high, about 9½ miles east-south-eastward of Apenberg. Pangiloen (page 328) and Padang (page 331) are also noticeable.

Chart 709, plan of Koninginne and Bungus bays.

KONINGINNE BAAI AND EMMA HAVEN.—Koninginne baai is entered between Ujong Djoengoet Batoe Pati, a high steep headland, and Ujong Soengei (Sungi) Bramei or Batu Mandi (*Lat. 1° 03′ S., Long. 100° 23′ E.*), another lofty headland, 2½ miles south-south-eastward. At the northern end of the bay is Emma haven, the port of Padang. The anchorage off the settlement at Emma haven is protected by a breakwater, extending in a south-easterly direction, but during the North-west monsoon there is often a considerable swell.

The shores of the bay are steep, overgrown, and mostly fringed by reef. The settlement, which, in 1943, had a population of about 1,400, is situated on the north-western side. On the eastern side, which is formed by a high ridge of hills, is Bukit Tampat, 325 feet ($99^{m}1$) high, 2¼ miles northward of Ujong Soengei Bramei, and the villages of Soengai (Sungi) Baramas, Taloek Niboeng (Taluk Nibung), and Taloek Bajoer (Taluk Bayur). *See* view facing this page.

The limits of the roadstead are an imaginary line joining the southern

Charts 2779, 2760, 748b.

Chart 709, plan of Koninginne and Bungus bays.

point of Koninginne baai and Pisang, the meridian of longitude through the western point of Pisang and imaginary lines drawn in a 045°–225° direction through Walvisch klip, close north-westward of Apenberg.

Dangers in approach.—Light.—Beacon.—Buoy.—Marlbro', a shoal, about 1½ miles west-north-westward of Ujong Soengei Bramei, has a depth of about 4 feet ($1^{m}2$), and is steep-to.

A light is exhibited, at an elevation of 36 feet ($11^{m}0$), from a black iron framework structure, 39 feet ($11^{m}9$) in height, on Marlbro'.

A reef, with a depth of one fathom ($1^{m}8$), and another, with a depth of 3 feet ($0^{m}9$), lie 5 and 8½ cables, respectively, northward of Marlbro' light structure.

Pasir Gedang, a sand cay fringed by a reef, and covered with coconut palms, lies about one mile north-north-eastward of Marlbro'. It is marked on its western edge by an iron beacon, surmounted by a red ball.

Between Pasir Gedang and Emma haven breakwater are two 3-fathom ($5^{m}5$) patches.

A 4-fathom ($7^{m}3$) patch lies about 1¼ miles northward of Ujong Soengei Bramei, and about half a mile from the eastern side of the bay. It is marked on its northern side by a white conical buoy.

Chart 709, plan of Emma haven.

On Karsik, a coral reef in the middle of Emma haven, there is a breakwater.

Light.—Light-buoys.—A light is exhibited, at an elevation of 17 feet ($5^{m}2$), from a white iron framework structure, on the head of the main breakwater, and a light is shown from the south-western end of Karsik reef breakwater.

A light is exhibited, at an elevation of 24 feet ($7^{m}3$), from a white stone beacon, 3 feet ($0^{m}9$) in height, on the western side of Bukit Tampat.

A light-buoy, painted black, exhibiting a *red fixed* light, is moored close off the north-eastern end of Karsik reef breakwater.

Pilotage.—Pilotage is compulsory. Pilots are stationed at Emma haven. By day, the pilot vessel displays a blue flag, with a white star on it ; at night the steam pilot vessel shows a *white* light over a *red* light ; the sailing pilot boat shows a *red* light only.

Vessels approaching the anchorage should make the customary signal of the International Code of Signals for a pilot, and, if necessary, display the quarantine signal, and wait for a pilot.

Chart 709, plan of Koninginne and Bungus bays.

Signal station.—Signals.—There is a signal station and a flagstaff on Ujong Soengei Bramei (*Lat. 1° 03′ S., Long. 100° 23′ E.*). Vessels should keep the Pilot signal displayed until they are answered by one of the following signals :—

Signal.	*Signification.*
By day, a black cylinder. By night, a rocket.	The vessel is observed.
By day, the Company's flag, the National flag, or the vessel's signal letters in the International Code of Signals. By night, a *red* light.	Pilot is proceeding to the vessel.

Charts 2779, 2760, 748b.

Chart 709, plan of Koninginne and Bungus bays.

Signal.	*Signification.*
By day only, a black cylinder over a black ball.	The vessel must remain outside the harbour limits until further orders.
By day only, one black ball.	The vessel may enter.
By day, a black ball above two black cones, points up, disposed vertically. By night, a *red* light above two *white* lights, similarly disposed.	Await further orders.
By day, a black diamond shape, or two black cones, bases together, disposed vertically. By night, a *white* light over a *green* light.	No pilot is available. Vessel may enter without one.
By day, a black ball over a black cone, point up. By night, a *red* light over a *white* light.	Pilot will not board vessel outside. Vessel may enter without a pilot until one is met.

Chart 709, plan of Emma haven.

Tidal signals are made from the Harbour Master's office at the root of the main breakwater.

Chart 709, with plan of Koninginne and Bungus bays.

Directions.—A vessel from northward should pass half a mile southward of Pandan, thence between Bindalang and Siboentar thence she should steer for Pisang, and when about 2 miles from it steer to pass westward of Marlbro' light structure, and thence between it and Ujong Soengei Bramei (*Lat. 1° 03′ S., Long. 100° 23′ E.*).

A vessel from Priaman bound for Koninginne baai may take the inshore route, and pass westward of Pisang, thence as above directed.

Approaching from southward by day, a vessel may pass on either side of Njamoek, thence well westward of Marak, thence on either side of Bintanggor, and Sirandah, and thence she should steer for Marlbro' light structure, passing eastward of the 6-fathom ($11^{m}0$) patch about 1¾ miles northward of Sirandah.

By night the vessel should pass one mile westward of Njamoek on a 015° course; when Bintanggor is abeam she should steer for Marlbro' light, bearing about 022°, passing between Gosong Sirandah and the 6-fathom ($11^{m}0$) patch about 1¼ miles east-north-eastward of it. Bintanggor can generally be seen when passing it, even on the darkest night.

Chart 709, plan of Koninginne and Bungus bays.

After rounding Marlbro' shoal, the vessel should enter Koninginne baai with the light structure on the head of the main breakwater in line with the gap in the hills westward of Bukit Poetoes (Putus) at the head of the bay, bearing about 023°, which will lead between Pasir Gedang and the white conical buoy marking the 4-fathom ($7^{m}3$) patch eastward of it, thence into Emma haven.

Tidal streams.—Off Padang the tidal streams set north-westward and south-eastward, at a maximum rate of one knot. In the southern approach to Koninginne baai there is seldom any tidal stream.

Chart 709, plan of Emma haven.

Mooring buoys.—There are numerous mooring buoys, the positions of which may best be seen on the chart.

Charts 2779, 2760, 748b.

Chart 709, plan of Emma haven.

Wharves.—Depths.—There are three wharves of a total length of about 1,100 feet (335^{m}3), lying in a north-easterly and south-westerly direction, with depths, in 1945, of from 21 to 28 feet (6^{m}4 to 8^{m}5) alongside. The coaling wharf, at the northern end of the harbour, had, in 1945, a depth of 28 feet (8^{m}5) alongside. There is a wharf at the root of the main breakwater, 315 feet (96^{m}0) long, facing north-east, with a depth of 31 feet (9^{m}4) alongside.

The wharves and coaling wharf are connected to the railway system. Two travelling cranes, each with a lifting capacity of 8 tons, are situated on the main wharves. In 1945, it was reported that only one of the cranes was in use.

At the root of the breakwater facing south-east, is the salt jetty, with a depth alongside, in 1945, of 20 feet (6^{m}1); about half a cable south-eastward of it is the oiling jetty, with a depth alongside, in 1945, of 20 feet (6^{m}1). There are also five small piers in the harbour.

Vessels lying alongside the main wharves, can, on application, be connected to the telephone system.

Harbour facilities.—A large stock of coal is maintained at Emma haven. Coal can be obtained and put on board at a maximum rate, in 1944, of 300 tons an hour. Fuel oil can be obtained alongside the oiling jetty at a rate, in 1941, of about 50 tons an hour.

Water is laid on to the wharves. Vessels can also be supplied by water boat. Fresh provisions are plentiful.

The steam pilot vessel is the only tug available.

Small repairs to the hull and machinery of vessels can be effected. Repairs to small craft can be carried out alongside the wharf at the north-eastern end of Karsik reef breakwater. There are three hospitals at Padang.

Quarantine.—The quarantine station is on Pisang (*Lat. 1° 00′ S., Long. 100° 20′ E.*). For deratisation, *see* page 17.

Trade.—The principal exports are coal and cement.

Communication.—Emma haven is connected with Padang and the Ombilin coalfields in the interior by railway.

There is regular communication by steamer with other ports in Sumatra.

Padang.—Padang, situated on the northern bank of Batang Arau, is the capital of the Residency of the west coast of Sumatra, and is the most important trade centre of the whole coast. It is considered one of the most attractive places in the Netherlands East Indies, owing to its open situation and its tall coconut palms and tropical firs which surround it. Along the right bank of the river are the banks, mercantile offices, and warehouses.

The population, in 1943, was about 70,000.

Fresh provisions may be obtained. Small craft which can reach Padang can discharge their cargo direct into railway trucks alongside the river bank.

Communication.—Padang is connected to the railway system.

Trade.—Padang is an open port. The principal exports are coffee, rubber, coal, copra, cement, damar, rattans and tobacco; the chief imports are iron, piece goods, matches, flour, rice, salt and dried fish.

Meteorological table.—*See* page 41.

Batang Arau.—Batang Arau is navigable only for craft with a draught of not more than 6 feet (1^{m}8); there is a depth of about 7 feet

Chart 709, plan of Emma haven.

(2^{m}1) on the bar. With a strong westerly or north-westerly wind the sea breaks entirely across the entrance and for some distance seaward, and all river traffic is suspended. The stream off the entrance is strong at times.

For description of the coast southward, *see* page 353.

Charts 2779, 2780.

MENTAWEI EILANDEN.—Mentawei eilanden consist of four large islands, viz. :—Siberoet Sipoera (Sipora), Noord Pagai and Zuid Pagai, and of several smaller, of which only the larger islands are permanently inhabited. They are hilly and of volcanic formation, and earthquakes occur occasionally. A heavy breaking sea prevails on the western coasts, rendering landing almost impossible at all times.

The group belongs to the Residency of the West coast of Sumatra, and forms a sub-division of the Padang division, the principal Government official living at Moeara Siberoet (*Lat. 1° 36′ S., Long. 99° 13′ E.*) in Siberoet baai.

The eastern coasts are particularly unhealthy.

The villages are small, only rarely exceeding 100 inhabitants. In language, customs and appearance, the inhabitants are totally unlike those of Sumatra, and their origin is uncertain. They are very primitive, the men only wearing a loin cloth, and the women a plantain leaf petticoat, and both sexes are largely tattooed. They are peaceful and honest, but very shy.

Discoloured water was frequently seen during the survey off the east coasts of Mentawei eilanden, but deep water was always found over these spots.

SIBEROET.—Siberoet, the northernmost large island of the Mentawei eilanden, is low, swampy, and densely wooded down to its coasts; there are some low hills inland, but they are difficult to identify. The only place of any importance is the settlement of Moeara Siberoet, in Siberoet baai, at the south-eastern end of the island. The inhabitants live mostly in the interior as the coastal districts are generally swampy. The east coast is nearly everywhere overgrown with mangroves, with a few sandy beaches; the west and south coasts are nearly all sandy beaches, on which there is a constant surf, rendering landing difficult. On the east coast there are several well-sheltered anchorages.

All the rivers of any importance discharge on the east coast and have bars at their mouths, rendering them passable only by boats.

The north coast has been described on pages 326-327.

WESTERN SIDE OF SIBEROET.—Coast.—The western coast of Siberoet is densely wooded, and, except for the steep stretch northward of Tanjong Mongaboeroe (Mongaburu), situated about 21 miles north-westward of the southern extremity of the island, is bordered by a sandy beach. There are no conspicuous features on this side of the island. During the morning a thick haze, caused by the surf, hangs over the coast. The reefs cannot be distinguished on account of the muddy water which is discharged from the rivers and which extends well out into the offing.

The only danger outside a distance of 2 miles from the coast is

Charts 2760, 748b.

Charts 2779, 2780.

a shoal with a depth of 4 fathoms (7m3), lying 7¾ miles north-westward of Tanjong Mongaboeroe and 2¼ miles offshore.

The best landing place is in Poeseratat (Puseratat) baai, situated on the northern side of Tanjong Mongaboeroe, where there is a reef which forms a natural breakwater extending about 3 cables from the northern side of the point; the steep northern part of the bay may be identified by some white and yellow patches. In very calm weather landing may be effected off the mouth of Kali Simaleki, about 13 miles southward of Boompjeshoek (page 327), and northward of Kali Simataloe, about 11 miles north-north-westward of Tanjong Mongaboeroe.

The south coast is described with Seaflower channel on page 342.

Chart 2779.

EASTERN SIDE OF SIBEROET.—Coast.—This coast is continually undergoing a slow change of formation, dead trees and broken trunks are seen standing in the water at many of the projecting points.

Laboean Badjau (Labuan Bajau), on the south-eastern side of Tanjong Sigep (page 327), affords anchorage for vessels with local knowledge with westerly winds, in its entrance, in a depth of about 25 fathoms (45m7), with Masien (*see* below), bearing about 128°, just open of the south-eastern entrance point of the bay.

At the head of the bay is a deep basin, which can only be reached by boats.

Coast.—Dangers.—Between the south-eastern entrance point of Laboean Badjau and the point about 5½ miles southward, the coast is fronted by several detached reefs, which are mostly marked by discolouration, and the seaward edge by breakers.

Masien, a low wooded islet, lies on the western edge of a detached reef, about 2¼ miles south-eastward of the south-eastern entrance point of Laboean Badjau, and about 1¼ miles offshore. About one mile south-eastward of Masien is a reef with a depth of 2¾ fathoms (5m0); it is the outermost danger in this vicinity.

Anchorage may be obtained by vessels with local knowledge about 7 cables southward of Masien, in a depth of 6 fathoms (11m0), with the south-eastern entrance point of Laboean Badjau in line with Tanjong Sigep (*Lat. 0° 55′ S., Long. 98° 54′ E.*), bearing 321°.

Chart 3856, plan of Tabekat bay.

From Masien a chain of reefs extends for 4¾ miles southward. Karang, a low wooded islet, lies on the western edge of one of these reefs, about 3¾ miles southward of Masien and about three-quarters of a mile offshore. The southernmost of these reefs, which is steep-to, is marked by a sand cay on it.

Tabekat baai.—Dangers.—Tabekat baai, the entrance to which lies about 7½ miles southward of Tanjong Sigep, affords sheltered anchorage from all winds, in depths of from 8 to 12 fathoms (14m6 to 21m9), being protected from seaward by the islets of Oemana (Umana) and Langeirak.

The coast northward of the bay is steep-to, densely wooded with high trees. Tabekat (chart 2779), a hill 935 feet (285m0) high, and somewhat conical in shape, lies 7¾ miles southward of Tanjong Sigep and 2 miles inland, and is the highest summit in the vicinity.

Oemana, at the northern end of the bay, is low with high trees, and

Charts 2760, 748b.

Chart 3856, plan of Tabekat bay.

is fringed by a reef, which extends 2½ cables from its northern end. About 3½ cables eastward of its southern end is Katoembang (Katumbang), an islet fringed by a reef, and between them is a reef which dries. A reef, which dries, lies 3½ cables eastward of the north-eastern extremity of Oemana, with a 4¾-fathom (8^m7) patch between, and another reef which dries and is steep-to, about 2 cables southward of the same islet.

Langeirak, fringed by reef except on its western side, lies 9 cables southward of Oemana. The fringing reef extends about 1½ cables from the northern end of the islet, and for about 2¾ cables from the southern end. On the western side of the islet is a coconut plantation.

Limo, 3 cables southward of Langeirak, is joined to the coast by a narrow sand ridge covered with casuarina trees.

Kali Tabekat discharges westward of Langeirak, and a mudbank, which dries, extends 3 cables from its mouth; it can only be entered by boats at high water. In the river there are depths of from 2 to 3 fathoms (3^m7 to 5^m5), and boats can ascend for some distance to a village, off which there is a depth of 5½ fathoms (10^m1); the banks of the river are thickly overgrown with mangroves and nipa palms. On the northern side of the entrance to the river is a hut, visible from eastward, and 4½ cables north-north-westward, lying close offshore, is Oedmadjorong (Umajorong), an islet difficult to distinguish.

Anchorage.—Directions.—A well-sheltered anchorage may be obtained between the mudbank extending from the mouth of the Kali Tabekat and Limo, in a depth of about 8 fathoms (14^m6).

Approaching Tabekat baai a vessel should keep the southern extremity of Oemana in line with Tabekat hill (*Lat. 1° 02′ S., Long. 98° 54′ E.*), bearing 283°, until the sand cay, situated 8½ cables north-eastward of Katoembang, is in line with Karang, bearing about 336°, when she should steer about 263° to pass midway between the reef southward of Oemana and that extending northward from Langeirak. This passage is about 3½ cables wide, and the reefs on either side are steep-to. When the whole of Limo is open westward of Langeirak, she may anchor, or proceed to the anchorage north-westward of Limo, keeping close off the western coast of Langeirak to avoid the mudbank off the mouth of Kali Tabekat.

Chart 2779.

Coast.—About 3¼ miles south-eastward of Limo is Ujong Sikabaloean, noticeable from northward or southward. It may be identified by the termination of a long line of casuarina trees which stand north-westward of it, the coast southward of it being bordered by mangroves. Kali Silipat discharges at the point, off which a reef extends about 2½ cables. There is a settlement of native traders here, and a large house stands on the north-western side of the entrance. A good anchorage may be obtained by vessels with local knowledge, in a depth of about 15 fathoms (27^m4), northward of the point.

Between Ujong Sikabaloean and Ujong Silogoei, 6 miles southward, the coast is fronted by detached reefs which lie from half a mile to one mile offshore.

Chart 3856, plan of Telok Silogui.

Telok Silogoei.—Dangers.—Telok Silogoei, entered between Ujong Silogoei and Ujong Basoeboekan (Basubukan), about one mile southward, affords anchorage, in a depth of about 20 fathoms (36^m6), *Chart 3856, plan of Telok Silogui.*

off the mouth of Monga Silogoei, which discharges into the head of the bay.

A reef, with a depth of 1¼ fathoms ($2^{m}3$), and steep-to, lies nearly in the middle of the entrance, about half a mile southward of Ujong Silogoei. A reef, which dries, lies 4 cables westward of this reef, and another reef, which dries, lies 3 cables from the southern shore, and 4 cables westward of Ujong Basoeboekan. A reef, which is steep-to, extends from the mouth of the Monga Silogoei.

The bay should be entered by passing close northward of Ujong Basoeboekan.

Charts 2779, 2780.

Coast.—Dangers.—Midway between Ujong Basoeboekan and Ujong Roegoen Roegoen (Rugun Rugun), about 3 miles south-south-eastward, there is a settlement of Malay traders at Moeara Tjimpongan. The mouth of the river may be identified by a noticeable casuarina tree on the point southward of it and several high casuarinas on the southern entrance point. A few large praus are usually to be seen lying in the river mouth.

The coast for about 1¼ miles northward of Ujong Roegoen Roegoen is fringed by a reef which extends about half a mile north-eastward from that point. This point and a point about 1¼ miles southward are the entrance points of a bay, at the head of which are Telok Soebeleng and Telok Sipompong; the latter, which is the southern of the two, has a depth of 18 fathoms ($32^{m}9$) in the middle.

About 5½ miles west-south-westward of Ujong Roegoen Roegoen is a noticeable hill with a sharp cone, 853 feet ($260^{m}0$) high, at its southern end.

Tabanan, a low wooded islet, fringed by a reef, lies half a mile south-eastward of Ujong Roegoen Roegoen (*Lat. 1° 16′ S., Long. 99° 04′ E.*), with a deep channel on either side of it. About half a mile eastward of it is Gosong Belakang Tabanan, which dries, and about 4 cables south-westward of the islet is a 5-fathom ($9^{m}1$) patch, between which and the coast south-westward of it, is Gosong Sipompong. About 1½ miles south-south-eastward of Tabanan and about 4 cables offshore is Kasih Gosong Saibi, which dries.

Chart 3856, plan of Saibi road.

Reede Saibi.—Dangers.—Ujong Goenong (Gunong) Saibi lies about 2¾ miles southward of Ujong Roegoen Roegoen and 6 cables within it is Saibi, a noticeable hill, 446 feet ($135^{m}9$) high. Segoenei (Segunei), a hill, 184 feet ($56^{m}1$) high, and of a light green colour, lies about three-quarters of a mile south-south-eastward of Saibi hill.

Gosong Saiba di Tangah, a reef with a depth of 3 feet ($0^{m}9$), lies one mile east-north-eastward of Ujong Goenong Saibi.

Between Ujong Goenong Saibi and Ujong Moeara (Muara) Saibi, about 2 miles southward, a bank of mud and sand, with depths of less than 3 fathoms ($5^{m}5$), extends from about 2 to 5 cables offshore.

There is a small settlement of Malay traders on the northern side of the Moeara Saibi, which discharges 1¼ miles southward of Ujong Goenong Saibi, and between it and Segoenei are the remains of a European settlement and the ruins of a small pier.

There is a least depth of about 3 feet ($0^{m}9$) on the bar fronting Moeara Saibi, and a least depth of 9 feet ($2^{m}7$) inside for a distance of 4 miles up river.

Charts 2760, 748b.

Charts 3856, plan of Saibi road.

Pandjang Saibi, the northern extremity of which lies about 2½ miles south-south-eastward of Ujong Goenong Saibi, is fronted by islets and reefs, some of which dry, lying about half a mile off its north-eastern side, and one mile eastward of its eastern extremity.

A well-sheltered anchorage may be obtained by vessels with local knowledge westward of Pandjang Saibi. Approaching from southward, a vessel should steer for some conspicuous trees standing in the middle of the mangroves, on Ujong Ajer (Ayer) Memboseh, situated about 2¼ miles south-south-eastward of Ujong Moeara Saibi, bearing 277° ; this leads between the outer reefs. To reach the anchorage local knowledge is necessary.

Small craft may obtain anchorage, in a depth of 5 fathoms ($9^{m}1$), off the mud and sand bank which extends offshore northward of Moeara Saibi.

Charts 2779, 2780.

Coast.—Telok Mototoin, entered on the southern side of Ujong Ajer Memboseh, and Telok Laboean Korong, about one mile farther south-eastward, are narrow but both are deep and free of dangers in the fairway. A vessel could safely run into the former on a south-westerly course. Between these bights, and about a quarter of a mile offshore, is Laboean Korong, with a reef extending about a quarter of a mile from its south-eastern side, and a reef between it and the coast.

Between the eastern entrance point of Telok Laboean Korong and Ujong Laboean Boeloe Boeloe (Bulu Bulu), about 3 miles south-south-eastward, and which can be identified by its dead trees, there are several detached reefs, with depths of from one to 5 fathoms ($1^{m}8$ to $9^{m}1$), lying from about a quarter to three-quarters of a mile offshore. Laki Laki, a hill, 650 feet ($198^{m}1$) high, lying about 1½ miles north-westward of Ujong Laboean Boeloe Boeloe (*Lat. 1° 27′ S., Long. 99° 10′ E.*) and half a mile inland, is very noticeable. This is the only cliffy part of the east coast of Siberoet.

Chart 3856, plan of Telok Saribua.

Telok Sariboea.—Dangers.—Telok Sariboea, entered between Ujong Boelaumongai (Bulaumongai), the southern extremity of an island, about 3½ miles southward of Ujong Laboean Boeloe Boeloe, and Ujong Sariboea, 5½ cables farther southward, affords a sheltered anchorage for vessels with local knowledge. This island is low and covered with mangroves, except for a hill, 190 feet ($57^{m}9$) high on its western extremity ; the northern end of the island is separated from the coast by foul ground. From the eastern side of this island and from the coast northward of it, Gosong Ridai, an extensive reef, which dries in places, extends about one mile offshore. Near its northern end is Ridai islet and several other islets lie on it.

About midway between the entrance and its head, the bay is encumbered with many islets and reefs which dry, and which are clearly visible.

A vessel should steer about 264° when entering, and pass close westward of the 190-foot ($57^{m}9$) hill, mentioned above, thence she should pass between the reefs by eye.

Chart 2780.

Coast.—Dangers.—Between Ujong Sariboea and Ujong Onai, about 2¾ miles southward, the coast is fronted by several detached reefs,

Chart 2780.

on which are Kasih di Tapi and Kasih di Tengah, two sand-cays, covered with vegetation, lying about 1½ miles offshore.

Chart 3856, plan of Simalepet and Siberut roads.

Telok Simalepet.—Telok Simalepet, on the southern side of Ujong Onai, is about 1¼ miles wide at its entrance. Simalepet is an islet separated from the northern shore of the bay by a deep channel clear of dangers; its southern end is nearly joined to the western shore of the bay by a shoal extending westward from the islet.

Two islets lie on the coastal reef on the southern side of the bay, about 3 cables southward of Simalepet .

Anchorage may be obtained between Simalepet and the northern shore of the bay.

Siberoet baai.—**Light.**—Siberoet baai lies with its entrance between the southern entrance point of Telok Simalepet and Ujong Sikabai, about 3½ miles east-south-eastward. Kali Moeara Siberoet discharges on the western side of the bay, and on the northern side of its entrance is the town of the same name, which is the headquarters of an Administrator. The river is fronted by a bar, with a least depth of about 5 feet (1^m5). Inside the bar there is a least depth of 10 feet (3^m0), for a distance of about one mile up river.

About 2 cables northward of the entrance to the river is a flagstaff, close eastward of which is a noticeable light green tree, with a small pier about one cable northward of it.

A bank of mud and sand, which is very steep to, extends about 3 cables from the mouth of the river.

A light (*Lat. 1° 36′ S., Long. 99° 13′ E.*) is occasionally exhibited, at an elevation of 37 feet (11^m3), from two wooden posts at the root of the pier.

The limits of the roadstead are the parallel of latitude through the south-eastern entrance point of Telok Simalepet and the meridian of long. 99° 13′ 50″ E.

Charts 3856, plan of Simalepet and Siberut roads, 2780.

Anchorage.—**Directions.**—Anchorage may be obtained, in a depth of about 19 fathoms (34^m7), about 2¼ cables from the pier-head.

On approaching the anchorage a vessel should steer for the northern side of the gap in the hills behind the town, bearing about 211°; when abeam of Kasih di Tengah, she should keep the pier-head in line with the light green tree on the same bearing, which will lead to the anchorage.

Chart 2780.

Coast.—Telok Pinang Pinang, entered between Ujong Pinang Pinang, a point with some dead trees on it, situated about 3½ miles south-eastward of Ujong Sikabai, and Ujong Bereket, about 4 cables southward, is clear of danger and affords a well sheltered anchorage to vessels with local knowledge.

Lappi, a low islet, fringed by a reef, lies about three-quarters of a mile south-eastward of Ujong Bereket, with a passage about 3 cables wide clear of dangers in mid-channel between them.

Toedangin (Tudangin) and Baboei are two islands lying close inshore southward of Ujong Bereket. Between the northern end of Toedangin and the coast is Telok Masiloh, which affords good anchorage for vessels with local knowledge. The narrow channel between these islands and the coast, and between the two islands are only practicable for boats.

Charts 2760, 748b.

Chart 2780.

Sibaboei, about 3 cables offshore and 2 miles southward of Ujong Toedangin, the south-eastern point of Toedangin island, is an islet with high trees on its western side and low trees on its eastern side. About half a mile south-eastward of it is Gosong Sibaboei, with a depth of one fathom ($1^{m}8$), and always marked by discolouration. A 5-fathom ($9^{m}1$) patch lies about 8 cables southward of Sibaboei.

Chart 3856, plan of Telok Katurei.

Telok Katoerei.—Dangers.—Telok Katoerei (Katurei) is entered between Ujong Sibadjau, about 3¾ miles south-south-westward of Ujong Toedangin, and Liboet (Libut), an islet 1¾ miles farther south-westward.

Ujong Sibadjau has a narrow sandy beach, and is covered with high trees, as is also Liboet.

Siloina, an islet very similar to Sibaboei, with high trees on its western side, lies 1½ miles southward of Ujong Sibadjau, with several reefs, with depths of from 1½ to 2 fathoms ($2^{m}7$ to $3^{m}7$), between ; these dangers are generally marked by breakers.

Chart 2780.

Two reefs, with depths of 5 and 9 feet ($1^{m}5$ and $2^{m}7$), lie about 2½ and 5 cables, respectively, south-south-eastward of Siloina ; they are not marked by discolouration.

Chart 3856, plan of Telok Katurei.

A one-fathom ($1^{m}8$) patch lies about 2 cables northward of Liboet, and several shoals, one of which dries, lies within 7 cables south-eastward of the same islet.

The shores of the bay consist of densely overgrown hilly land ; along the western side of the entrance there is thick vegetation close to the water's edge. The only inhabited part is the village of Katoerei, some distance inland from the shore of the inlet, near Maoemoen (Maumun), a hill on the western side of the head.

Ujong Masipehoe (*Lat. 1° 41′ S., Long. 99° 14′ E.*), about 5 miles above Liboet, can be identified by Djai Djai (Jai Jai), a steep hill, 308 feet ($93^{m}9$) high ; it is the southern extremity of a tongue of land which divides the inlet into two arms, the western of which is named Telok Melaggai.

Moeara Katoerei, off which a bank extends 2½ cables, is situated at the head of the inlet.

A weak current sets continuously out of the inlet.

Anchorage may be obtained by vessels with local knowledge in Telok Katoerei, as far in as Toimian, an islet situated 3¾ miles northward of Liboet.

Anchorage.—Directions.—A vessel should approach Telok Katoerei with Ujong Sibadjau bearing 270°, then after rounding that point closely, she should pass southward of the reef, which can always be distinguished, about 7 cables west-south-westward of the point, thence pass close westward of Koebau (Kubau) besar, on the eastern side of the inlet just inside the entrance. Proceeding up the inlet she should keep to the eastern side of the fairway, fairly close to the eastern shore. About half a mile below Ujong Masipehoe the channel becomes shallower and more difficult, but a vessel of light draught can reach the head of the inlet.

Charts 2779, 2780.

Tidal streams.—On the east coast of Siberoet, northward of Telok

Charts 2779, 2780.

Sariboea, the north-going stream has a rate of 1½ knots, but the south-going stream is weak and indefinite. Southward of Telok·Sariboea there is a constant south-easterly set, with a rate of 1½ knots.

Chart 2780.

SEAFLOWER CHANNEL.—Seaflower channel, between the islands extending from the southern end of Siberoet and the northern end of Sipoera, is named after H.M. brig *Seaflower*, Captain W. F. W. Owen, which passed through the channel in 1806.

The channel, which is 14½ miles wide, is clear of dangers, except for a 6-fathom (11^{m}0) patch, which is not marked by discolouration, situated 1½ miles north-westward of the northern extremity of Pototogat, an island off the northern end of Sipoera. It has the disadvantage of having no suitable anchorage, and for this reason, Straat Siberoet is recommended in preference.

The tidal streams are generally weak in the middle of the channel and are influenced by the wind, but they often cause dangerous whirlpools, and run strongly between the islands off the south-eastern end of Siberoet.

Northern side of Seaflower channel.—Coast.—Tanjong Mongaboeroe (page 335) and Tanjong Simansih, about 5 miles south-eastward, are both covered with casuarina trees, and the southern point of Siberoet is low and wooded. About 1½ miles northward of this point is Tobow, the only hill in this vicinity which can be identified; there is a higher summit, having an elevation of 728 feet (221^{m}9), about 3½ miles northward of Tobow, but it cannot be identified.

Telok Taileleo, lying westward of Ujong Sidjaga (Sijaga), the south-eastern extremity of Siberoet, is clear of dangers and the depths decrease gradually towards the shore, but there is no shelter from the swell. Landing is generally possible on the western shore of the bay, between the rocks on the coastal reef. There is a small settlement at the western end of the bay, and Taileleo village stands about 2 miles northward of it.

Islands and dangers.—Djoedjoeat (Jujuat) (*Lat. 1° 48′ S., Long. 99° 02′ E.*), the westernmost island off the southern side of Siberoet, lies about 3¾ miles westward of the southern extremity, and about 1¼ miles offshore. A shoal, with depths of from 3½ to 5 fathoms (6^{m}4 to 9^{m}1), lies about 2¼ miles west-north-westward of Djoedjoeat.

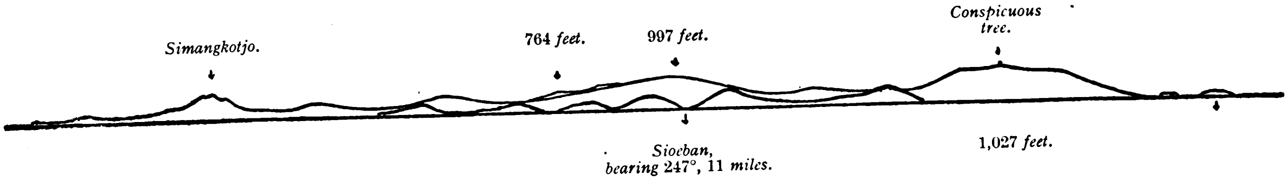
Si Njau Njau (Nyau Nyau) lies 3¼ miles south-eastward of Djoedjoeat, with several shoals, with depths of from 1½ to 5 fathoms (2^{m}7 to 9^{m}1) between.

Koraniki lies about 1½ miles southward of the western entrance point of Telok Taileleo, with a 1½-fathom (2^{m}7) patch between, and another patch with the same depth, and on which the sea breaks, about one mile southward of the island. These three islands are low, thickly wooded, and uninhabited.

Extending about 9 miles south-south-eastward from Ujong Sidjaga, lie four islands and several islets, all uninhabited.

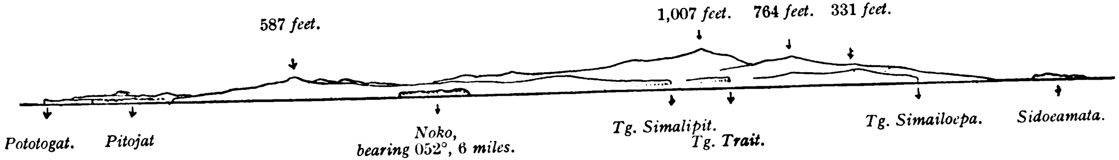
Karamadjet, the southernmost island, has a low hill in the middle with some high dark trees on it, and there are some dead trees standing on its south-eastern side. The two Pananggalan islets, close off its north-eastern side, are covered with high trees, and fringed by a reef; there is a large tree on Pananggalan besar, the southern islet. There

Charts 2760, 748b.



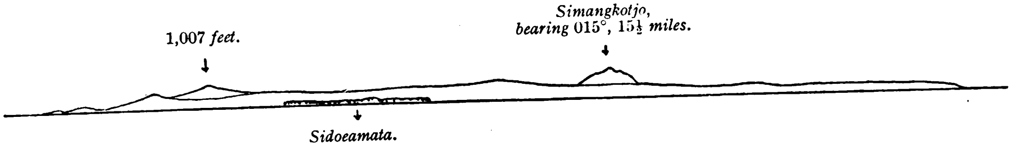
Sipoera, east coast.

(*Original dated* 1929.)



Sipoera, west coast.

(*Original dated* 1921.)



Sipoera, south-west coast.

(*Original dated* 1921.)

Chart 2780.

is a sheltered anchorage for vessels with local knowledge in Telok Teteingerah, south-westward of Pananggalan besar. There is no navigable passage between these islets and Karamadjet.

A 3-fathom ($5^{m}5$) patch lies half a mile northward of Pananggalan kechil.

Botiek, a low and wooded island, lies about one mile north-north-westward of Karamadjet, with a least depth of 8 fathoms ($14^{m}6$) between them. This is the only safe passage between these islands. Two 4½-fathom ($8^{m}2$) patches lie about three-quarters of a mile westward of Botiek. Mainoe (Mainu), about 1¼ miles north-eastward of Botiek, is low with high trees; the passage between the two islands is encumbered with reefs. Many sunken reefs lie off the northern side of Mainoe, and between it and the south-eastern side of Njang Njang (Nyang Nyang) is an islet covered with vegetation and fringed by a reef, with very irregular depths in the vicinity.

Njang Njang, a low, densely wooded island, has two small bays on its eastern side, off which several reefs extend about 4 cables. Ujong Poelanggadjet (Pulanggajet), the south-western extremity of the island, may be identified by its high dark-coloured trees. A noticeable slanting tree stands on the north-western extremity of the island. The passage between this point and Siberoet is very dangerous as it has a strong current setting through it, and is encumbered with reefs.

A sheltered anchorage may be obtained by vessels with local knowledge off Monga Masausioe, on the southern side of Njang Njang.

Southern side of Seaflower channel.—The southern side of Seaflower channel is formed by the north-western coast of Sipoera.

Siboeroe (Siburu) baai, formed between the northern coast of Sipoera and the islands Pototogat, Simakakak, and Siboeroe (Siburu), off-lying it, affords shelter to vessels with local knowledge from the swell and all winds, in a depth of 18 fathoms ($32^{m}9$). The shores of the bay are uninhabited, but it is a regular resort of fishermen. Simakakak is 315 feet ($96^{m}0$) high, and Siboeroe, 469 feet ($142^{m}9$).

The channel is deep in the fairway but reefs extend 6 cables from the southern shore and one mile southward from the south-western extremity of Siboeroe; the best approach passes close to the south-eastern end of Siboeroe.

Setan (*Lat. 1° 58′ S., Long. 99° 34′ E.*), a cliffy islet, with some rocks above water close off its north-western and north-eastern sides, lies 4 cables north-westward of Siboeroe.

For the 6-fathom ($11^{m}0$) patch 1½ miles north-westward of Pototogat, *see* page 342.

SIPOERA.—The most prominent summits are:—the hill, 1,027 feet ($313^{m}0$) high, with a noticeable tree on it, 5¼ miles south-south-eastward of the northern extremity of the island; seen from south-eastward and north-westward it appears as a ridge running approximately east and west with the tree on its western end. The hill, 1,007 feet ($306^{m}9$) high, about the middle of the island and 2½ miles from the south-western coast, is best seen from north-westward. Simangkotjo (Simangkocho), 768 feet ($234^{m}1$) high, is a cone-shaped hill, 6¼ miles from the south-eastern point of the island. *See* views facing this page. The remainder of the island is low, swampy and wooded; dense vegetation extends to the water's edge.

Charts 2760, 748b.

Chart 2780.

The inhabitants, who are not numerous, are peaceable but quite uncivilised. Communication with them can be had through an interpreter who may be obtained at Moeara Siberoet (page 340).

WESTERN SIDE OF SIPOERA.—Coast.—The western coast is mostly low and swampy, and is indented by several bays.

Telok Siberimanoea.—Dangers.—Telok Siberimanoea, at the north-western end of the island, affords the best anchorage on the western side, as it is sheltered by Pitojat (Pitoyat), a low, thickly wooded island, with another island lying on the same reef close north-westward of it. The southern approach to these islands is free of dangers and has a least depth of 8 fathoms (14^{m}6) in the fairway.

About 2 miles northward of Pitojat and one mile offshore is a shoal with a depth of 3½ fathoms (6^{m}4), and a shoal with a similar depth lies between it and the coast eastward. A 7-fathom (12^{m}8) patch lies one mile north-north-eastward of the eastern extremity of Pitojat and half a mile from the eastern shore of the bay.

A rivulet discharges into the head of the bay, and on its right bank about three-quarters of a mile from the mouth are several villages, the principal of which is Tikaroesoet.

Farther northward the coast is uninhabited.

Coast.—Danger.—About 4½ miles southward of Pitojat is Noko, a low, densely wooded island, from which a ridge, with depths of less than 10 fathoms (18^{m}3), extends about 1½ miles north-westward. Between Noko and the coast eastward there is a clear passage, half a mile wide, with a least depth of 7 fathoms (12^{m}8) in the fairway.

About 1½ miles south-south-westward of Noko is a coral patch, over which there is a depth of 9 fathoms (16^{m}5).

South-eastward of Noko all the bays on this coast are open to the prevailing swell; Simailipit baai, entered between Tanjong Simailipit, about 2¼ miles south-eastward of Noko, and Tanjong Trait, about one mile farther south-eastward, and Trait baai, on the eastern side of Tanjong Trait, can be entered without difficulty. A rivulet, with a village, lies near the head of each of these bays.

EASTERN SIDE OF SIPOERA.—Coast.—For about 7 miles south-eastward of the eastern entrance point of Siboeroe baai (page 343) there are several narrow bights with considerable depths, the shores of which are uninhabited. Siloinan village (*Lat. 2° 06′ S., Long. 99° 41′ E.*) stands half a mile inland at the south-eastern end of this stretch of coast, and is the principal one of a group in the vicinity.

A 2½-fathom (4^{m}6) patch lies about 2¼ miles south-eastward of the south-eastern extremity of Siboeroe and 7 cables from the north-eastern coast of Sipoera.

Chart 3856, plan of Siuban bay.

Baai van Sioeban.—Baai van Sioeban (Siuban), entered about 5 miles southward of Siloinan, is the only inlet of any importance on the east coast. There is a police camp on the south-eastern entrance point, where a clearing has been cut in the trees, which is visible from some distance.

A bank, with depths of less than 3 fathoms (5^{m}5), which is very steep-to, extends about 2½ cables from the head of the bay, and a reef extends about 1¼ cables north-north-westward from the south-eastern

Charts 2760, 748b.

Chart 3856, plan of Siuban bay.

entrance point. There is a small pier on the inner side of the south-eastern entrance point where small craft can lie alongside. Temporary anchorage may be obtained in the bay.

Chart 2780.

Coast.—About 2¾ miles southward of Baai van Sioeban, the Sibarau rivier discharges; a mud bank extends about a quarter of a mile from its mouth, and here the 10-fathom ($18^{m}3$) line lies about 6 cables offshore.

Chart 3856, plan of Telok Semebai.

Telok Semebai.—Telok Semebai, entered about 6 miles south-eastward of Baai van Sioeban, may be identified by Simangkotjo (chart 2780). Near the middle of the bay is a sandbank, which dries, which may be passed on either side. Temporary anchorage may be obtained in the bay.

Sikidji village lies about one mile westward of the north-western entrance point.

Chart 2780.

Coast.—Dangers.—About 2½ miles south-eastward of the south-eastern entrance point of Telok Semebai, and about 4 cables offshore is a small sand-cay, above water; both north-westward and south-eastward of it is a small reef which dries. Between these and the coast is a channel clear of dangers.

Tanjong Batoe (Batu) Kinapat, the south-eastern extremity of Sipoera, is fringed by a narrow reef. From about 1¾ to 4 miles northward of the point the coast forms a bight which is mostly occupied by the Poesiripangan (Pusiripangan) eilanden, which are fringed by a reef and are difficult to distinguish.

STRAAT SIPOERA.—Straat Sipoera (Sipora) is about 9 miles wide between Tanjong Batoe Kinapat and Tanjong Soemiajoe (Sumiayu), the north-western extremity of Noord Pagai (North Pagi). It is deep and clear of dangers, except for a bank, with a least depth of 6 fathoms ($11^{m}0$), lying about 4 miles westward of Tanjong Soemiajoe.

Tidal streams.—The tidal streams in Straat Sipoera are generally weak and are influenced by the wind, but a rate of 1½ knots has been observed off the 6-fathom ($11^{m}0$) shoal mentioned above.

Northern side of Straat Sipoera.—Tanjong Simailoepa is a noticeable headland, about 3¾ miles south-eastward of Tanjong Simailipit; it is fringed by a reef which extends about a quarter of a mile offshore. Between it and Tanjong Simadjaua, about a mile east-north-eastward is an inlet, open southward. A reef extends half a mile southward from Tanjong Simadjaua.

Sidoeamata (Siduamata), a low and thickly wooded island, lies 6 miles south-eastward of Tanjong Simadjaua (*Lat. 2° 17′ S., Long. 99° 38′ E.*), and one mile offshore. A reef, which fringes the southern side of the island, extends half a mile from the south-eastern end. There is a bight on the northern side where the Malay traders load their produce. In the passage between the island and Sipoera there are several shoals, with depths of from 4½ to 5 fathoms ($8^{m}2$ to $9^{m}1$), but, with local knowledge, a depth of 7 fathoms ($12^{m}8$) can be carried through. *See* view facing page 343.

Tobo, an islet, fringed by a reef, lies about 2 cables from the Sipoera coast, northward of the northern extremity of Sidoeamata.

Charts 2760, 748b.

Chart 2780.

Southern side of Straat Sipoera.—The northern coast of Noord Pagai forms the southern shore of Straat Sipoera. Tanjong Pinang Pinang, the north-eastern extremity of the island, is a well-defined headland, covered with casuarina trees. A river discharges about half a mile westward of the point. The hills at the northern end of the island are difficult to distinguish.

A 3-fathom ($5^{m}5$) patch lies about **3** cables offshore and about 7 cables eastward of Tanjong Pinang Pinang.

PAGAI EILANDEN.—Pagai (Pagi) eilanden, consisting of Noord Pagai and Zuid Pagai, are separated from one another by the narrow and deep Straat Sikakap, and are generally known locally as Pulau Sikakap.

The inhabitants, who are not numerous, are peaceable but quite uncivilised. There are detachments of armed police on the island; the natives are forbidden to carry arms. An interpreter may be obtained at Sawangtoengko (page 347). Native trade is carried on by means of praus, and is entirely in the hands of Malays.

Noord Pagai (North Pagi) is hilly, the highest point having an elevation of 1,220 feet ($371^{m}9$), situated 9½ miles north-eastward of Tanjong Ratai, the southern extremity of the island, but the summits are very difficult to identify; the hilly land lies in the middle of the island, and runs in a north-westerly and south-easterly direction. The coasts are everywhere flat, except the northern part of the west coast, which is hilly and in some places rocky. The south-west, south, and east coasts are low and marshy. The island is fringed by a narrow reef, the **10** fathom ($18^{m}3$) line running fairly close to the coast.

Zuid Pagai (South Pagi) is hilly, the northern part particularly having the appearance of high downs. A level ridge of hills, 1,204 feet ($367^{m}0$) high, running practically across the island and descending to the coast eastward of Bitodjat besar (page 349), about 12½ miles southward of the north-western extremity of the island, is very noticeable from north-west and south-east. A hill, 1,033 feet ($314^{m}9$) high, with a noticeable tree on its summit, near the northern end of the island, is prominent except from southward. The hills on the southern tongue of land are isolated and are visible from both the west and east coasts.

Western side of Noord Pagai.—Coast.—Tanjong Takarimau, about 3½ miles southward of Tanjong Soemiajoe, is cliffy. Tanjong Sigogoa (*Lat. 2° 38′ S., Long. 100° 02′ E.*), 4 miles farther southward, is sharply defined as a steep isolated rock joined to the coast by a narrow spit. Batu Malai, fringed by a reef, lies about **3** cables offshore between these two points. A rock, which dries, lies about 3½ cables southward of Tanjong Sigogoa. The coast is uninhabited, and landing cannot be effected anywhere. *See* view facing page 348.

Si Laboe Laboe baai.—Si Laboe Laboe (Labu Labu) baai, entered about 7½ miles southward of Tanjong Sigogoa, affords a safe anchorage, being protected by Si Laboe Laboe (Labu Labu) gedang, which extends nearly across the entrance. Eastward of this island is Si Laboe Laboe kechil, with a narrow channel between them, having depths of from **4** to 10 fathoms ($7^{m}3$ to $18^{m}3$).

Anchorage may be obtained by small vessels with local knowledge north-eastward or eastward of Si Laboe Laboe kechil and the best

Charts 2760, 748b.

Chart 2780.

approach to it is to pass northward of Si Laboe Laboe gedang, avoiding the reef with a depth of 2½ fathoms ($4^{m}6$), extending 2 cables from the eastern side of the entrance. The channel southward of the islands is less than three-quarters of a cable wide between the shore reefs, with irregular depths, and is not recommended. Between Si Laboe Laboe kechil and the head of the bay there are several reefs.

Si Laboe Laboe rivier and village are situated in the northern bight of the roadstead, and the Malay village of Tatiri in the southern.

Coast.—Betoemonga (Betumonga) baai, entered between Tanjong Si Njai (Nyai), situated about 2 miles southward of Si Laboe Laboe gedang, and Tanjong Betoemonga (Betumonga), about 2½ miles farther south-south-eastward, and Sabeo goegoek (guguk), entered about 3 miles east-south-eastward of Tanjong Betoemonga, are both clear of dangers, but open to the swell. At the head of each bay there is a rivulet and village.

Chart 3856, plan of Sikakap strait.

Straat Sikakap.—Dangers.—Straat Sikakap, separating Noord Pagai from Zuid Pagai, has a least width of 3 cables, and a least depth of 8 fathoms ($14^{m}6$) in the fairway, and can be used by large vessels. Heavy squalls are rare in the strait, except during November and December.

In the southern entrance are the islands Noesa (Nusa), Siopa besar and Siopa kechil. Siopa besar has a hill at its north-western end, with a noticeable tree on its summit. The channel for large vessels is between Noesa and Siopa besar; the channel between Noesa and Noord Pagai and that between Siopa besar and Siopa kechil are encumbered with shoals, but between Siopa kechil and Zuid Pagai there is a least depth of 6 fathoms ($11^{m}0$) in the fairway.

On the eastern side of the strait are the low, thickly wooded islands Ragi, Loemoei (Lumui) and Masoesoe (Masusu). A shoal, with a depth of 2 fathoms ($3^{m}7$), lies 3½ cables south-south-westward of Ragi, and there are two 3-fathom ($5^{m}5$) patches close off the western shore westward of Ragi and Loemoei.

Bakat Peigoe (Peigu), a hilly and thickly-wooded islet with high trees, lies near the middle of the strait and can be passed on either side, but the eastern is preferable for large vessels as the bend is not so sharp. Eastward of Bakat Peigoe and close to Zuid Pagai is a rock which dries, and about 6 cables south-westward of the islet and close to Noord Pagai is a 3-fathom ($5^{m}5$) patch.

Taikako rivier discharges northward of Bakat Peigoe (*Lat. 2° 48′ S., Long. 100° 10′ E.*); the bar off the entrance to this river can only be crossed by a steamboat at high water, but within, the depths increase to 2 and 3 fathoms ($3^{m}7$ and $5^{m}5$), and the large villages Silaoinan and Taikako are situated about half an hour's steaming up-stream.

About 1¾ miles east-north-eastward of the mouth of Taikako rivier, on the northern shore of the strait, standing on the spur of a ridge, is the missionary station of Nennemleleo, with its church, dwellings and landing stage, and midway between is Kaote village. On the opposite side of the strait, southward of Nennemleleo, is Seai village.

The eastern end of the strait is deep and clear of danger, with densely-wooded shores. On the northern side of the entrance is Togoet (Togut), a hill, 797 feet ($242^{m}9$) high, and noticeable from eastward; at its foot is a police camp, named Sawangtoengko, with a

Charts 2760, 748b.

Chart 3856, plan of Sikakap strait.

landing stage, and the Malay village of Berre, about 3 cables south-westward. In the inlet between the mission station and Berre is Krawe, an islet, and at the head of the inlet is a rivulet and Si Bai Bai village.

South-eastward of Krawe, close to the southern shore, is Sangko, an islet. In the middle of the eastern entrance is Tonggo, a hilly island, with a noticeable tree on its summit, but from seaward it is difficult to identify. The passage southward of it is not recommended. About 3 cables eastward of it is a shoal which dries, and about 1½ miles eastward of it is Si Djau Djau (Jau Jau), a low islet.

Tidal streams.—In Straat Sikakap the rate of the stream seldom exceeds 2 knots; the stream turns at the times of high and low water.

Anchorage.—Directions.—Anchorage may be obtained close off Berre and Sawangtoengko.

A vessel approaching the southern entrance to Straat Sikakap, after passing between Noesa and Siopa besar, should keep in mid-channel, thence westward of Masoesoe and eastward of Bakat Peigoe, thence in mid-channel and westward of Tonggo. Vessels drawing not more than 10 feet ($3^{m}0$) may pass eastward of Ragi, Loemoei and Masoesoe.

The eastern entrance to Straat Sikakap is not easily identified from eastward; it is best to proceed along the coast until the strait opens, and the islands at the entrance are seen detached, but on approaching the entrance, Tonggo should not bear less than 220°. Koerintji (page 354), in Sumatra, bearing 044° astern, leads to the eastern entrance. *See* view facing this page.

Chart 2780.

Eastern side of Noord Pagai.—Coast.—The villages of Pasapoeat, (Pasapuat), Si Ngau Ngau, and Simangandjo are situated 3½, 5¾ and 6½ miles, respectively, south-eastward of Tanjong Pinang Pinang.

Chart 3857, plan of Si Jau Jau anchorage.

Si Djau Djau anchorage.—Dangers.—Good anchorage may be obtained between Si Djau Djau (Jau Jau) and Kiki, two low wooded sand cays lying about 3 and 5 miles, respectively, south-eastward of Tanjong Pinang Pinang (*Lat. 2° 30′ S., Long. 100° 00′ E.*), and from three-quarters of a mile to 1¼ miles offshore. There are other reefs in the vicinity, the positions of which may best be seen on the chart.

Chart 3857, plan of Saumanganya road.

Reede Saoemanganja.—Danger.—Reede Saoemanganja (Saumanganya) is situated off the village of the same name, about 10 miles south-eastward of Tanjong Pinang Pinang. A reef, on which is an islet, covered with coconut palms, named Saoemanganja (Saumanganya), extends about 1½ cables from the mouth of a river, which discharges at the village, of the same name.

A rock, with a depth of about 4 feet ($1^{m}2$), lies about 3 cables northward of Saoemanganja, and about 2¾ cables farther northward and half a mile offshore is a shoal, with a depth of 3 fathoms ($5^{m}5$).

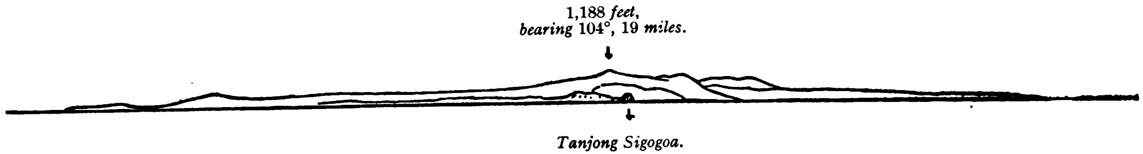
Anchorage may be obtained in Reede Saoemanganja.

Chart 2780.

Coast.—Dangers.—Tanjong Simatobe lies about 4 miles south-eastward of Saoemanganja, and about 2½ miles farther south-eastward is Simatobe village standing on the northern bank of a rivulet which discharges there. About 6 miles southward of the village is the northern entrance point of Straat Sikakap, 2 miles northward of which is

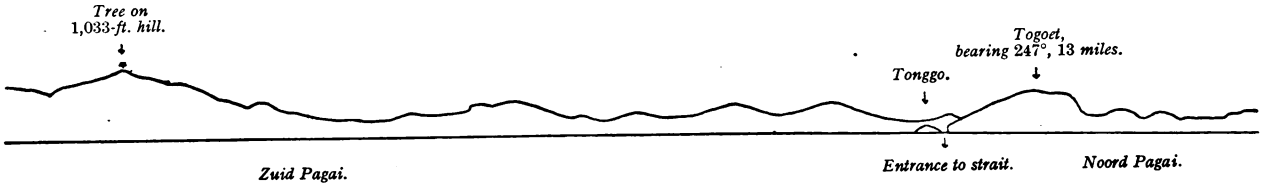
Charts 2760, 748b.

To face page 348.



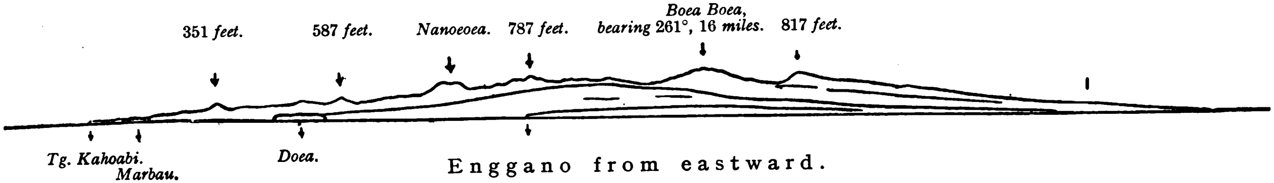
Noord Pagai, west coast.

(*Original dated* 1929.)



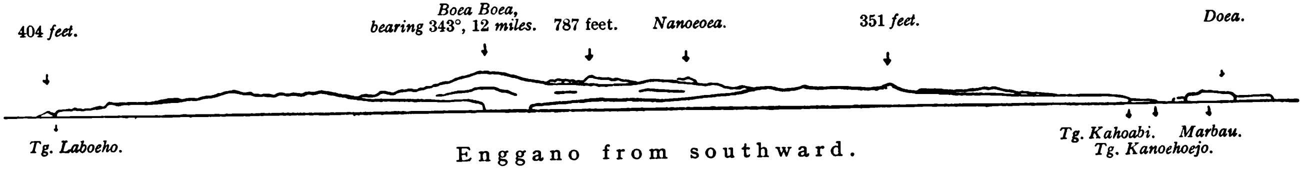
Eastern approach to Straat Sikakap.

(*Original dated* 1921.)



Enggano from eastward.

(*Original dated* 1921.)



Enggano from southward.

(*Original dated* 1921.)

Chart 2780.

a small sand cay which nearly covers, lying about 3 cables offshore. A shoal, with a least depth of 2 fathoms (3^m7), extends 3½ cables eastward from the sand cay, and a rock, with a depth of less than 6 feet (1^m8), lies about 4 cables northward of the sand cay, and half a mile offshore.

Except for the dangers previously mentioned, the whole of the east coast of Noord Pagai can be closely approached.

Western side of Zuid Pagai.—Islands and dangers.—The western side of Zuid Pagai is fronted by a chain of low densely wooded islands, on which there are coconut plantations; they are uninhabited but are occasionally visited by the natives from the main island.

Bitodjat besar and Bitodjat kechil, about 7 miles southward of Siopa kechil (page 347), are two islands separated by a narrow channel, in which there is a depth of 5 fathoms (9^m1).

Sibigau, an island on which there is a noticeable tree, lies about 2 miles south-south-eastward of Bitodjat besar, and is joined to Zuid Pagai by a ridge, with depths of less than 10 fathoms (18^m3). Ragi, an islet fringed by a reef, lies on this ridge; elsewhere there are depths of not less than 6 fathoms (11^m0).

Between Liboeat (Libuat), an island about 3 miles south-south-eastward of Sibigau, and Silau, an island about 5½ miles farther in the same direction, there is a reef, on which the sea always breaks. About 3 miles eastward of Liboeat is Sioemang (Siumang), an island separated from the coast of Zuid Pagai by a narrow passage with a depth of 3 fathoms (5^m5).

Si Baroe Baroe (Baru Baru), an island fringed by a reef, except on its north-eastern side, lies about 4½ miles south-south-eastward of Silau, and is joined to the coast northward of it by a ridge with depths of less than 10 fathoms (18^m3) and only 3 fathoms (5^m5) in places. An extensive reef, on which the sea nearly always breaks, lies about 1¼ miles north-westward of this island and is connected to the coast of Zuid Pagai, north-eastward of it, by a ridge with depths of from 7 to 10 fathoms (12^m8 to 18^m3).

The navigation between the islands and Zuid Pagai is safe and sheltered from swell, except at Si Baroe Baroe (*Lat. 3° 17′ S., Long. 100° 20′ E.*), which it is advisable to pass outside.

There are numerous inlets on the west coast of Zuid Pagai, but the only one of any use is Tio baai, entered about 11 miles north-westward of Tanjong Bio, the southern extremity, which affords good sheltered anchorage for vessels with local knowledge; the depths decrease regularly and there are some islets at the head; the shores are uninhabited. Boelasat, eastward of Sibigau, is the southernmost village on the west coast, along which the inhabitants are seldom met.

Eastern side of Zuid Pagai.—Coast.—Beacon.—For about 5 miles south-eastward of the southern entrance point of the eastern entrance to Straat Sikakap the coast is much indented and fronted by many islands and reefs, the principal of which are Siatanoesa and Si Ngi Ngi; this area has not been thoroughly surveyed and should be avoided. Thence southward the coast becomes hilly and rocky in places, interspersed with plantations on the slopes, and some villages and rivulets. Towards Tanjong Sibeloea, situated about 20 miles from the entrance of Straat Sikakap, the coast is low; this point, on

Charts 2760, 748b.

Chart 2780.

which there is a white beacon, can be identified from northward and southward by a slanting overhanging tree.

About one mile southward of Tanjong Sibeloea, is the entrance to a small inlet with a narrow entrance, which is encumbered with islets and rocks, and about 2 miles farther southward is Labadjau village.

Chart 3857, plan of Veeckens bay.

Islands and dangers.—Labadjau, an island fringed by a reef on its eastern side, lies about 3½ miles southward of Tanjong Sibeloea, and is separated from Zuid Pagai by a narrow passage, in which there is a least depth of 2 fathoms ($3^{m}7$). A rock, which dries, lies half a mile eastward of the island, and a rock, with a depth of less than 6 feet ($1^{m}8$), lies about 2 cables southward of the island. Another rock, which dries, lies 1½ miles eastward of the southern extremity.

Si Ngi Ngi is an island lying 2 miles southward of Labadjau, and connected to the coast westward by a ridge, with a depth of one fathom ($1^{m}8$). A shoal, with a depth of 3 fathoms ($5^{m}5$), lies about 2¼ miles east-north-eastward of the island, and a 2-fathom ($3^{m}7$) patch lies about 2 miles east-south-eastward of the island.

Si Djau Djau (Jau Jau), an islet with reefs extending 2¾ and 3¾ cables, respectively, from its northern and southern ends, lies about 2½ miles east-south-eastward of Si Ngi Ngi. A 3-fathom ($5^{m}5$) patch lies 9 cables south-south-eastward of the southern extremity of Si Djau Djau, with a 5-fathom ($9^{m}1$) patch between.

Veeckens baai.—Dangers.—Veeckens baai is formed between the south-eastern coast of Zuid Pagai and a group of low islands, all densely wooded and uninhabited, extending about 10 miles south-eastward from Tanjong Si Ngi Ngi, which lies about 7 miles southward of Tanjong Sibeloea. The bay affords safe anchorage, but as its shores and the islands are infested with mosquitoes, it is inadvisable to anchor near the shore. In the middle of the bay there is a least depth of 19 fathoms ($34^{m}7$), mud and sand, and in the north-western corner of the bay vessels can proceed some distance up between the islets, in depths of 8 fathoms ($14^{m}6$).

The shores of the bay are uninhabited, but the bay is frequented by fishermen from the villages northward of it.

Tinopo, the largest island of the group, is separated at its northern end from Tanjong Si Ngi Ngi (*Lat. 3° 08′ S., Long. 100° 28′ E.*) by Straat Tinopo, about 9 cables wide. Simonga, an island, fringed by a reef, lies 3¾ miles south-south-eastward of Tinopo, with an extensive reef, with depths of less than 6 feet ($1^{m}8$), on which the sea breaks, between. Samuel rif, on which the sea breaks, lies about 7 cables south-south-eastward of Simonga. About 2½ miles north-westward of Simonga is Sioemang (Siumang), an island, from which a reef extends about 2 cables south-south-eastward. A reef, on which the sea breaks, lies 5½ cables south-westward of Sioemang. The positions of the islands and dangers south-westward of Tinopo may best be seen on the chart. The dangers in the bay can easily be distinguished.

Anchorages.—Directions.—Anchorage may be obtained, in a depth of about 15 fathoms ($27^{m}4$), about half a mile off the middle of the west coast of Tinopo, and towards the head of the bay, in a depth of about 10 fathoms ($18^{m}3$), mud, about 6 cables westward of Bakat, situated 4½ miles west-south-westward of Tanjong Si Ngi Ngi.

The bay is easiest and safest to enter from southward, the fairway

Charts 2780, 2760, 748b.

Chart 3857, plan of Veeckens bay.

being generally deep, the only dangers being Samuel rif and the reef south-westward of Sioemang. A vessel may enter by Straat Tinopo by steering 216°, passing between the drying reef and the 3-fathom ($5^{m}5$) patch north-eastward of the entrance ; or a vessel may approach Tanjong Sibeloea (chart 2780) and then steer for the entrance of the strait by keeping close to the coast, avoiding the drying rock half a mile eastward of Labadjau.

Coast.—The southern end of Zuid Pagai consists of a tongue of land, 558 feet ($170^{m}1$) high, terminating in Tanjong Bio, on which there is nearly always a heavy surf. On the north-eastern side of this tongue of land some islets lie close off the coast.

Chart 2780.

Straat Sanding.—Dangers.—Straat Sanding, between the southern end of Zuid Pagai and Sanding, is deep in the fairway, and clear of danger, except for Europa riffen and the rocks extending from the northern side of Sanding. This island, lying 12½ miles south-eastward of Tanjong Bio, is low, densely wooded, and fringed by a reef extending 2¼ miles northward, but only a short distance elsewhere. Stoepaï (Stupaï), a wooded islet, lies on the reef about 1½ miles northward of the eastern extremity of Sanding. Westward of the islet is a narrow channel affording anchorage for small craft with local knowledge. Sanding is inhabited by a few Malays.

Europa riffen, consisting of two separate patches about three-quarters of a mile apart with deep water between, lie about 4¼ miles south-westward of Sanding. They are often marked by breakers and the least depth over them is probably not more than 4 fathoms ($7^{m}3$).

Charts 2780, 2781.

MEGA.—Dangers.—Mega, 38 miles south-eastward of Sanding, is a low, thickly-wooded island, fringed by a reef, but is visible a distance of about 16 miles in clear weather. The island is inhabited by a few Malays. The only landing place is on the north-eastern side near some huts.

Several shoals, with depths of 3 and 5 fathoms ($5^{m}5$ and $9^{m}1$), lie within 1¼ miles of the south-eastern side of the island and within half a mile of the north-western side. There is an 8-fathom ($14^{m}6$) patch 4½ miles westward of the island.

Anchorage may be obtained, in a depth of about 10 fathoms ($18^{m}3$), sand, 3¼ cables off the east coast, abreast the landing place, with the extremities of the island bearing 225° and 315°.

Chart 2781.

ENGGANO.—Enggano, the south-easternmost of the large islands fronting the west coast of Sumatra, lies about 100 miles south-eastward of Mega, and 60 miles from the coast. The north-western portion is flat, and the south-eastern portion hilly. Boea Boea (Bua Bua) (*Lat. 5° 25′ S., Long. 102° 17′ E.*), 922 feet ($281^{m}0$) high, near the middle of the island, is noticeable and Nanoeoea (Nanuua), a saddle-shaped summit, 640 feet ($195^{m}1$) high, lies about 4 miles north-westward of the south-eastern extremity of the island, and is noticeable from north-east, east, and south-west. There are also some small peaks at the south-eastern end of the island, south-westward of Enggano baai, and eastward of Tanjong Koöma the western extremity, which are noticeable.

Charts 2760, 748b.

Chart 2781.

There are no expanses of plain, as the spurs of the hills extend nearly everywhere to the sea, especially on the south-western and southern sides. The island appears as two hills, when bearing about 060°.

It is densely wooded, and cannot be said to have a beach, as the trees reach to and overhang it. A quantity of coconut palms are seen along the coast; the sea breaks heavily on the drying coral reefs, with which the island is fringed. There are heavy breakers on the reefs even in the calmest weather, making landing at most places impossible. *See* views facing page 348.

There are no roads on the island; the marshy interior is difficult to penetrate, and produces fever; communication between the villages is effected by boats. There are a number of rivulets throughout the island, and wild pigs are numerous. The island forms part of Benkoelen residency.

The inhabitants are scattered along the north-east coast, the remainder of the island being uninhabited. They are friendly and peaceable. There are many coconut plantations and some rubber and coffee.

On the eastern side of Tanjong Kiojo (Kioyo), about 7 miles south-eastward of Tanjong Koöma, there is an inlet between the reef extending southward from that point and the coast eastward of it, which affords some shelter to small craft with local knowledge.

Chart 3857, plan of Pulo Satu anchorage.

Pulau Satoe anchorage.—Dangers.—Pulau Satoe (Satu) anchorage is situated between the north-eastern side of the extensive reef on which Pulau Satoe lies, about 3¾ miles south-eastward of Tanjong Kiojo, and the coast of Enggano south-eastward of it. In the middle of the fairway is a 2¼-fathom ($4^{m}1$) patch, the best approach to the anchorage lying westward of it.

The coast of Enggano eastward and south-eastward of the anchorage is fringed by reefs which extend from 1½ to 7 cables offshore, and there are detached patches, with depths of from 2 to 3 fathoms ($3^{m}7$ to $5^{m}5$), lying nearly one mile offshore.

Chart 2781.

Vessels approaching Pulau Satoe anchorage from south-eastward should give Tanjong Laboeho (*Lat. 5° 31′ S., Long. 102° 17′ E.*) a berth of 2½ miles, then steer north-westward along the detached reefs westward of this point, on nearly all of which the sea breaks heavily, and thence to the anchorage, keeping close to the south-eastern edge of the reef on which Pulau Satoe lies, as it is always clearly visible.

Coast.—Telok Laboeho (Labuho), entered on the eastern side of Tanjong Laboeho (Labuho), the southern extremity of Enggano, affords little protection against the southerly swell. A vessel should anchor well out on account of the reefs and shoals with which the bay is encumbered. The shores of the bay are uninhabited, but there are a few huts on the beach.

Sunken rocks lie half a mile south-south-westward of Tanjong Laboeho.

Off-lying danger and bank.—An extensive reef, with a least depth of 1¾ fathoms ($3^{m}2$), and on which the sea breaks heavily, lies about 1¾ miles south-eastward of Tanjong Laboeho.

A bank, with a depth of 9 fathoms ($16^{m}5$), lies 3½ miles southward of Tanjong Kahoabi, 6 miles east-north-eastward of Tanjong Laboeho.

Charts 2760, 748b.

Chart 3857, plan of Engano bay and Telok Kiowa.

Enggano baai.—Dangers.—Enggano baai, the principal anchorage in Enggano, is entered between Tanjong Kahaobi and Tanjong Kanoehoejo (Kanuhuo), 4¼ miles northward; in its entrance are three islets, fringed by reef, on which the sea always breaks.

Pulau Doea (Dua), the northernmost islet, lies 1½ miles southward of Tanjong Kanoehoejo; it is wooded, and on its western side there is a pier and a flagstaff. It is the headquarters of a native Administrator.

Marbau, 1½ miles southward of Doea, is wooded. There is a deep, narrow passage between the reefs extending from Marbau and Tanjong Kahoabi.

Bangkei, three-quarters of a mile north-westward of Marbau, is a noticeable rock, having a high sandy beach, with a clump of trees; it is situated on the outer detached reef which lies south-eastward of Tanjong Omo, the north-eastern entrance point of Telok Kiowa, with no passage between.

A 1¾-fathom ($3^{m}2$) patch lies 4 cables east-north-eastward of Bangkei, and a 2-fathom ($3^{m}7$) patch about 2½ cables northward of the same islet.

Telok Kiowa, southward of Enggano baai, is deep and clear of dangers.

Anchorage.—Directions.—Good anchorage may be obtained between Pulau Doea and the coast of Enggano westward of it, in a depth of 14 fathoms ($25^{m}6$), sand, with the pier-head bearing about 112°.

The best approach is to pass northward of Pulau Doea, and then steer about 248° to the anchorage. A vessel may approach from southward by passing between Marbau and Tanjong Kahoabi (*Lat. 5° 29′ S., Long. 102° 23′ E.*), the reefs extending from which are plainly visible by discolouration; thence she should pass between the reef extending from the northern end of Marbau and Bangkei, taking care to avoid the 1¾-fathom ($3^{m}2$) patch about midway between. When there is much swell, both the detached patches south-westward of Pulau Doea are marked by the swell.

Charts 709, 2779, 2780, 2781.

COAST.—For about 30 miles southward of Koninginne baai (page 331) the coast is indented by numerous bays and inlets, several of which, being protected from the sea by the islands near them, form excellent harbours. The land near the sea is generally of moderate height, but farther in, more elevated.

Between Ujong Tandjoeng (Tanjung), situated about 72 miles south-south-eastward of Ujong Soengei Bramei, and Benkoelen (Benkulen), about 130 miles farther, there are no openings in the coast, but thence to Vlakke hoek, on the northern side of Straat Soenda (Sunda), there are again several bays. The sand-flat along the coast is everywhere narrow and in some places ceases altogether; this is particularly the case southward of Koninginne baai, and near Tjingkoek (Chingkuk) baai, about 18 miles south-south-eastward, where the mountains come close to the coast and give it a desolate appearance.

Between Indrapoera (page 358) and Pasar Mokko Mokko, 32 miles south-south-eastward, an alluvial plain separates the mountains from the coast, and renders the western portion of the Indrapoera district low and marshy, with a less healthy climate. The Benkoelen district

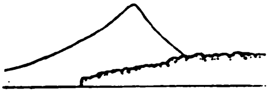
Charts 2760, 748b.

Charts 709, 2779, 2780, 2781.

also consists largely of flat land, or of undulating expanses, which rarely rise above 300 feet ($91^{m}4$).

The mountains are spurs of the Barisan gebergte, down the valleys of the western slopes of which run the rivers which discharge along this coast. Here the mountain range rises at a distance of from 15 to 30 miles from the coast, gradually decreasing in elevation as it trends southward. The whole range is mainly volcanic in character, and is joined to a submerged chain whose peaks form the islands lying from 45 to 70 miles westward of Sumatra. Numerous volcanoes exist, the peaks of which often emit smoke, and are seen rising above the other portions of the chain.

Northward of Indrapoera, the coast is very thinly inhabited.



Koerintji, bearing 054°.
(*Original dated* 1929.)

Koerintji (Kurinchi) or Piek van Indrapoera, 12,484 feet ($3805^{m}1$) high, situated 38 miles north-eastward of Ujong Tandjoeng (*Lat. 2° 09′ S., Long. 100° 49′ E.*), is the highest peak in Sumatra. In 1877, it was reported by an expedition that there were no actual craters in the mountain, but several fissures and holes, from which steam is emitted with terrific force. Patah Sambilan, 8,501 feet ($2591^{m}1$) high, lies about 7½ miles westward of Koerintji.

Between Ujong Tandjoeng and Vlakke hoek (Flat cape) there are no ports or anchorages that are safe during the North-west monsoon, and landing is always dangerous on account of the heavy surf.

Chart 709, plan of Koninginne and Bungus bays.

Boengoes baai.—Dangers.—Boengoes (Bungus) baai is entered between Ujong Soengei Bramei (page 331) and Ujong Teluk Boeo (Taluk Buo), 1¼ miles southward.

Karsik, an islet fringed by a reef, lies nearly in the middle of Telok Boengoes, the northern bight of the bay, and a rock, which dries, lies 7 cables southward of Karsik, and the same distance westward of the point separating Telok Boengoes from Telok Kaboeng (Kabung), the southern bight. A reef extends 2¾ cables south-westward from this point, and elsewhere in the bay the shore is foul to the distance of from one to 2 cables.

Anchorage may be obtained off Pasar Boengoes, on the eastern side of Telok Boengoes, in a depth of about 9 fathoms ($16^{m}5$), mud.

On the north-western side of the bay is a landing jetty for the use of the lighthouse keepers. There are several villages on the shores of the bay.

For the dangers in the south-western approach to Boengoes baai, *see* page 330.

Chart 709.

Coast.—Sungei Pisang baai, separated from Boengoes baai by Ujong Niboeng (Nibung), is open to westerly winds. Parsoempahan, a steep and high island, lies on the southern side of the entrance, 2½ miles southward of Ujong Niboeng, and two rocks, with depths of one and 2 fathoms ($1^{m}8$ and $3^{m}7$), lie within 4 cables northward of the island. Between these rocks and the north-eastern shore of the bay there is a deep narrow channel, and in the southern approach, between Sikowai, an island situated about 8 cables south-westward of Parsoempahan, and the southern entrance point of the bay there is also a deep narrow passage.

Charts 2760, 748b.

Chart 709.

The village of Sungei Pisang stands near the head of the bay eastward of Setan kechil, an islet situated about three-quarters of a mile eastward of Parsoempahan.

Sungei Pinang baai, entered between Ujong Kajoe (Kayu) Manang, nearly 6 miles southward of Ujong Niboeng, and Ujong Batu Garoedo, about 2½ miles east-south-eastward, is free from dangers.

Vessels may obtain anchorage sheltered from all winds, except those from south-south-west, in a depth of about 25 fathoms ($45^{m}7$), mud, in the north-western part of the bay.

The islands in the north-western and south-western approaches are described on page 330.

Chart 3852, plan of Tarusan bay.

Taroesan baai.—Danger.—Taroesan (Tarusan) baai entered between Ujong Batu Garoedo (Garudo) and Ujong Laboean Soendai (Labuan Sundai), about 3½ miles southward, is fronted by Tjoebadak (Chubadak), an island, 755 feet ($230^{m}1$) high, which is separated at its northern end from Ujong Batu Garoedo by Straat Sungei Njalo (Nyalo) ; this strait is deep and clear of dangers, except for a reef with a depth of 3 fathoms ($5^{m}5$), lying 2 cables north-westward of the north-western point of Tjoebadak.

On the north-eastern side of Tjoebadak is Telok Dalam, which has considerable depths and is clear of dangers. On the eastern side of its entrance is Tradjoe (Traju), an islet, fringed by a reef. Niboeng (Nibung) and Sirondjong kechil are two islets lying on the outer edge of the reefs extending from the southern and south-eastern extremities, respectively, of Tjoebadak.

Sirondjong besar, an island with a reef extending about 3½ cables from its north-eastern side, lies in the middle of Straat Sirondjong between the southern end of Tjoebadak and Ujong Laboean Soendai, on the mainland south-eastward, and may be passed on either side.

Setan kechil (*Lat. 1° 13′ S., Long. 100° 25′ E.*), 177 feet ($53^{m}9$) high, lies 8½ cables north-eastward of Sirondjong besar, and is fringed by a reef with overgrown rocks on it ; a line of reefs extends north-eastward from it to the head of the bay. *See* view facing page 359.

A shoal, with a depth of 5 fathoms ($9^{m}1$), lies about a quarter of a mile from the eastern side of Tjoebadak.

Tjarotjok (Charochok) village, with a pier, is situated on the south-eastern shore of the southern arm of Taroesan baai.

Tanjong Taloek Lamboe (Taluk Lambu), the south-western extremity of a prominent peninsula, which forms the southern side of Taroesan baai, lies about 2 miles southward of Ujong Laboean Soendai.

Chart 709.

Off-lying islands and dangers.—Koembang (Kumbang), an island fringed by a reef, lies about 3½ miles south-eastward of Ujong Taloek Lamboe. About 2 miles east-south-eastward of Koembang is Babi, an island, with a rock above water lying on the reef which fringes the south-western side. Simangké, about 2¾ miles south-eastward of Babi, is an islet, from which a reef, with a rock above water on it, extends about a quarter of a mile northward.

Gebua Dingin, a reef, with a depth of 3 fathoms ($5^{m}5$), lies about 5 miles south-westward of Koembang, and Gebua Namaja, with a depth of less than 6 feet ($1^{m}8$), lies 4¼ miles south-south-westward of the same islet.

Charts 2779, 2780, 2760, 748b.

Chart 709.

Aoer (Aur) gedang, an island situated about 3½ miles southward of Babi, has a noticeable round hill, 443 feet (135m0) high, near its southern end, and a reef extends from its western and southern extremities. About three-quarters of a mile southward of it is Aoer (Aur) kechil, 197 feet (60m0) high, with a reef, on which are some rocks above water, extending from its northern end, leaving a deep narrow channel between it and the reef extending from Aoer gedang.

Chart 3852, plan of Painan bay.

Painan baai.—Painan baai, entered between Ujong Karang, 11 miles south-eastward of Tanjong Taloek Lamboe, and Ujong Batoe (Batu) Rimau, about three-quarters of a mile southward, is protected from north-westerly winds by Tjingkoek (Chingkuk) besar, an islet 98 feet (29m9) high.

About half a cable south-westward of Ujong Karang, lying on the coastal reef, is Tjingkoek (Chingkuk) kechil, an islet 115 feet (35m0) high. Batu Dandang are some rocks above water lying on the western edge of the reef which extends 2¼ cables westward from the western extremity of the peninsula which forms the southern side of Painan baai.

Painan village, which is the headquarters of an Administrator, is situated on the north-eastern side of the bay.

Chart 709.

Vessels approaching Painan baai from northward are recommended to pass westward and southward of Koembang, Babi, and Simangké.

Coast.—Taloek Batoeng (Taluk Batung) baai lies southward of the peninsula which forms the southern side of Painan baai, and affords good anchorage in moderate depths for vessels with local knowledge, but the bay is open to westerly winds.

Nago (*Lat. 1° 25′ S., Long. 100° 33′ E.*) is an islet lying on the outer edge of the coastal reef which extends about 2½ cables from a position about three-quarters of a mile south-south-westward of the southern entrance point of Taloek Batoeng baai. A rock, which dries, lies close outside the islet.

Soengei Boengin (Sungi Bungin) baai is entered between a point about 1¼ miles southward of the southern entrance point of Taloek Batoeng baai, and Ujong Taloek (Taluk) Kasai, about 1½ miles farther southward. Taloek Kasai village stands on the southern shore of the bay.

Batang Kapas baai, entered between Ujong Taloek Tampoeroeng (Taluk Tampurung), about 3¾ miles south-south-eastward of Ujong Taloek Kasai, and Ujong Batoe Pandan, 2½ miles farther, affords good anchorage for vessels with local knowledge, but it is open to westerly winds.

Pandangoet, a reef on which the sea always breaks, lies about 1¼ miles southward of Ujong Batoe Pandan, and about three-quarters of a mile offshore. Karsik, an islet fringed by a reef, lies about 2½ miles farther southward and half a mile off Moeara Sirantih. Ujong Radja (Raja), about 5 miles southward of Ujong Batoe Pandan, has a hill, 407 feet (124m0) high, close south-eastward of it, and a hill, 262 feet (79m9) high, lies on the coast about 8 cables farther southward. Soegirik (Sugirik), a hill 820 feet (249m9) high, and Batu Tiga, 853 feet (260m0) high, close southward of it, lie 2¾ miles eastward of Ujong Radja. About 10 miles south-eastward of this point is Djalamoe (Jalamu), 341 feet (103m9) high.

Charts 2780, 2760, 748b.

Chart 709.

Off-lying islets and dangers.—Light.—Panjoe (Panyu), an islet fringed by a reef, lies about 6 miles south-south-westward of Aoer kechil. Erasmus reef, with a depth of 3 fathoms ($5^{m}5$), and Van Speik reef, with a depth of 1½ fathoms ($2^{m}7$), lie 2 miles north-north-westward and 2¾ miles east-north-eastward, respectively, of Panjoe. These reefs and also those south-westward of Koembang, mentioned on page 335, and those between Panjoe and Ujong Tandjoeng (Tanjung), 45 miles south-eastward, are steep-to, and are usually marked by discolouration, but the sea seldom breaks on them. Vessels should pass well westward of a line joining Njamoek (page 330) and Katang Katang, about 40 miles south-eastward.

Karaba kechil, an islet fringed by a reef, lies 9¼ miles south-eastward of Panjoe. About 4½ miles north-westward of Karaba kechil is Gebua Tenga, with a depth of 2½ fathoms ($4^{m}6$). A 6-fathom ($11^{m}0$) patch and Gebua Batang Kapas, with a depth of 10 fathoms ($18^{m}3$), lie about 1¼ miles westward and 1¼ miles southward, respectively, of Gebua Tenga ; a bank, with a depth of 10 fathoms ($18^{m}3$), lies the same distance northward.

Karaba gedang, an islet fringed by a reef, lies about 4½ miles south-westward of Karaba kechil, and a 6-fathom ($11^{m}0$) patch lies about 1½ miles north-westward of Karaba gedang.

Gosong, an islet fringed by a reef, lies 6 miles south-eastward of Karaba gedang, with a 4-fathom ($7^{m}3$) patch about midway between. A shoal, with a depth of 7 fathoms ($12^{m}8$), lies 1½ miles westward of Gosong.

Gosong Nambi, which dries, lies about 4½ miles west-south-westward of Gosong. Between Gosong Nambi and Katang Katang, an islet about 9 miles south-south-eastward, are several patches with depths of from one to 2 fathoms ($1^{m}8$ to $3^{m}7$), the positions of which may be seen on the chart.

A light (*Lat. 1° 53′ S., Long. 100° 34′ E.*) is exhibited, at an elevation of 63 feet ($19^{m}2$), from a white iron framework structure, 65 feet ($19^{m}8$) in height, on Katang Katang.

Baringin, the southernmost islet in this vicinity, is covered with high trees, and lies about 4¼ miles east-south-eastward of Katang Katang. About 1¾ miles north-north-westward of Baringin is a reef with a depth of 2 fathoms ($3^{m}7$) ; about one mile south-south-westward of the islet is a 5-fathom ($9^{m}1$) patch, and about 4 miles southward, a 2-fathom ($3^{m}7$) patch.

Coast.—Dangers.—Between Ujong Radja and Ujong Tandjoeng several rivulets discharge ; at or within their mouths there are villages visible from the offing. The sea usually breaks at the entrances.

Gebua Gedang, a reef with a depth of one fathom ($1^{m}8$), lies about 11½ miles south-south-eastward of Ujong Radja, and 1¼ miles offshore.

Gebua Poedong (Pudong), a reef which dries, lies about one mile southward of Gebua Gedang, with several patches, with depths of from one to 4 fathoms ($1^{m}8$ to $7^{m}3$), in its vicinity, the positions of which may best be seen on the chart.

Gebua Soemedang (Sumedang), a reef which dries, lies about 3½ miles south-south-eastward of Gebua Poedong, and 1½ miles offshore ; two shoals, with depths of one and 2½ fathoms ($1^{m}8$ and $4^{m}6$), lie half a mile west-south-westward and a quarter of a mile southward, respectively,

Charts 2780, 2760, 748b.

Chart 709.

of Gebua Soemedang. A 3-fathom (5^{m}5) patch lies close north-westward of the one-fathom (1^{m}8) shoal.

A 3-fathom (5^{m}5) patch lies 1½ miles west-north-westward of the mouth of the Air Soemedang (Sumedang), which flows out eastward of Gebua Soemedang.

Good temporary anchorage may be obtained anywhere off this coast.

Air Poenggasan (Pungasan) discharges about 2 miles north-north-westward of Air Soemedang. Poenggasan village is situated about 2 miles within the entrance. Air Hadji (Haji), which discharges 4¼ miles farther southward, may be identified by Lenggok, a remarkable sugar-loaf, wooded mountain, 1,280 feet (390^{m}1) high, 5¼ miles north-north-eastward of the entrance, which is otherwise not easily identified.

The bar of the river is dangerous for boats at low water, and at all times when there is a swell. There is a village 2 miles up the river.

Air Indrapoera, the most important river southward of Padang, discharges about 10 miles north-north-eastward of Ujong Tandjoeng. There is usually a heavy surf at the entrance, but small native craft can enter during the greater part of the year except at low water. It takes a very tortuous course to the town of Indrapoera, about 6 miles up-stream. The village of Pasir Ganting is at its mouth.

Reede Indrapoera.—Light.—Buoy.—Reede Indrapoera is an open roadstead situated off the mouth of the Air Indrapoera, and is the shipping place for the produce of Indrapoera. Large praus can ascend the river as far as Tapan, 14 miles from its entrance. There is a flagstaff at the mouth of the river.

A conical buoy, painted in red and black bands, surmounted by a ball, is moored about 1½ miles westward of the river entrance.

A light (*Lat. 2° 00′ S., Long. 100° 52′ E.*) is exhibited, at an elevation of 31 feet (9^{m}4), from a white iron structure, 20 feet (6^{m}1) in height, at the mouth of the Air Indrapoera.

Vessels may obtain anchorage from 2 to 2½ miles offshore, but the holding ground is not good.

Coast.—Ujong Tandjoeng or Hoek Indrapoera is low, and its extremity is wooded; it is steep-to, having a depth of 10 fathoms (18^{m}3) close to it.

Chart 2780.

Between Ujong Tandjoeng and Benkoelen, about 130 miles south-eastward, there are very few conspicuous features. Vessels making the passage close inshore should keep outside the 10-fathom (18^{m}3) line, and pass outside Sarang Alang (*see* below). The reefs close offshore are not marked by discolouration. Most of the rivers are inaccessible.

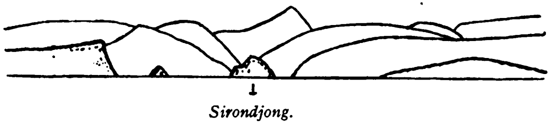
Pasar Mokko Mokko, the only settlement not visible from seaward on this coast, stands 31 miles south-eastward of Ujong Tandjoeng.

The entrance to the rivers may be identified by a gap in the casuarina trees; there is no coastal reef and the bottom falls away steeply. The muddy river water extends occasionally to 5 miles offshore.

Off-lying reefs.—Sarang Alang, a reef with a depth of 3 fathoms (5^{m}5), and steep-to, lies 5½ miles westward of the entrance to the Mendjoeto (Menjuto) and Slagan rivieren, which discharge through the same mouth about 28 miles south-eastward of Ujong Tandjoeng. With a heavy swell the sea breaks on the reef, but during calm weather

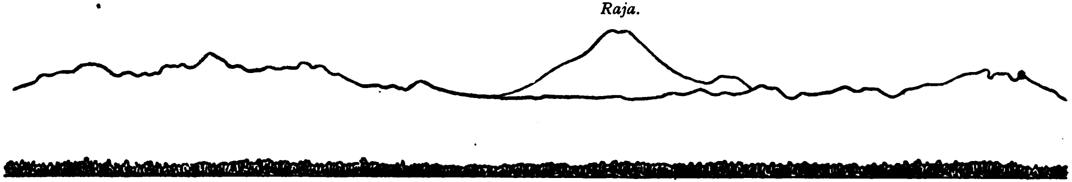
Charts 2760, 748b.

To face page 359.



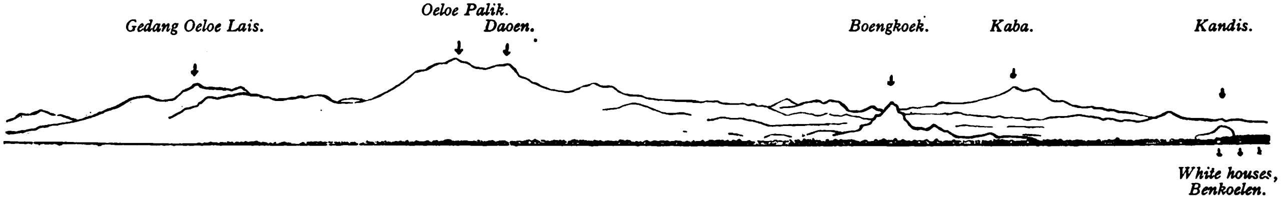
Southern entrance to Taroesan baai.

(*Original dated* 1929.)



Gunong Raja, bearing 045°.

(*Original dated* 1929.)



North-western approach to Benkoelen.

(*Original dated* 1929.)

it is not easily distinguished, on account of the muddy water from the rivers.

Aspect.—Pandan Gadang, 6,060 feet ($1847^{m}1$) high, lies about 25 miles north-eastward of Ujong Tandjoeng, and Talang, 4,518 feet ($1377^{m}1$) high, lies 27 miles eastward of the same point. Raja (Raya), 8,366 feet ($2550^{m}0$) high, lies about 13 miles south-eastward of Talang. (*See* view facing this page.) Masoerai (Masurai), 9,623 feet ($2933^{m}1$), lies about 29 miles farther in the same direction. Pandan, 7,113 feet ($2168^{m}0$) high, lies 15½ miles southward of Masoerai, and Seblat, 7,818 feet ($2382^{m}9$), 20 miles south-eastward of Pandan.

Nearer the coast are Gedang Oeloe (Ulu) Lais, 6,988 feet ($2129^{m}9$) high, lying about 32 miles northward of Benkoelen. Oeloe (Ulu) Palik, 8,202 feet ($2500^{m}0$), Boengkoek (Bungkuk) or Suikerbrood, 3,392 feet ($1033^{m}9$) high, and Kandis, 1,014 feet ($309^{m}1$), lie within 30 miles nearly in line south-south-eastward of Gedang Oeloe Lais. Kaba, 6,404 feet ($1951^{m}9$) high, is a volcano, constantly emitting vapour, lying 28½ miles north-eastward of Benkoelen; it had a great eruption in 1833, and was very active from 1875 to 1878.

Coast.—Dangers.—Aer Dikit, about 10 miles south-eastward of Pasar Mokko Mokko, and close southward of a bluff wooded point, may be identified by the denseness of the trees on each side of the mouth of the river. The bar of the river is dangerous and unnavigable even for boats.

Bantal, a river which discharges 7½ miles south-eastward of Aer Dikit, may be identified by two white rocks close northward of its mouth; Pasar Bantal stands on the southern side of the entrance.

Between Pasar Bantal and Pasar Ipoeh (Ipuh), 19 miles south-south-eastward, two rivers discharge, the Tramang and Aer Itam. The Tramang, the northern river, 2 miles from Pasar Bantal, has a small red cliff on the northern side of its entrance.

Pasar Ipoeh, about 7½ miles south-eastward of the mouth of the Aer Itam, may be identified by three red cliffs southward of it, and three green hills near the coast. The coast southward of Pasar Ipoeh consists of reddish cliffs.

Swallowfield rock (*Lat. 3° 01′ S., Long. 101° 27′ E.*), with a depth of 2½ fathoms ($4^{m}6$), lies about 2¾ miles north-westward of the mouth of Ipoeh rivier, and 1¼ miles offshore. A 2-fathom ($3^{m}7$) patch lies about 2 miles south-westward of the mouth, and a rock, with a depth of 3 fathoms ($5^{m}5$), lies about three-quarters of a mile southward of the 2-fathom ($3^{m}7$) patch.

The coast southward of Pasar Bantal is fringed by a coral bank which extends from 5½ to 8½ miles offshore, with depths of from 6 to 10 fathoms ($11^{m}0$ to $18^{m}3$) on its outer edge, and as far as Ketahoen, 48 miles south-eastward; it should not be approached inside the 10-fathom ($18^{m}3$) line, as it is steep-to in places and there are several shoal patches on it.

Seblat, 15½ miles south-eastward of Pasar Ipoeh, and Ketahoen appear as openings between reddish cliffs, and there is a white cliff southward of Ketahoen. Ketahoen rivier may be entered by small craft with local knowledge, but the channel is continually shifting; the river is navigable for about 15 miles from its entrance. On the southern side of the entrance to the river at Seblat there is a house with a conspicuous zinc roof, and on the southern side of the entrance to

Chart 2780.

Ketahoen rivier there are three houses with conspicuous zinc roofs. Approaching from south-eastward, these houses become visible when bearing 000°.

Between Seblat and Ujong Parit, 47 miles south-eastward, the coast consists of cliffs about 330 feet (100^{m}6) high, on which are some red clay patches, which are plainly visible. Laïs and Pasar Palik are two small villages, about 16 and 22 miles, respectively, south-eastward of Ketahoen, with red cliffs between them.

Between Ketahoen and Benkoelen, there are patches with depths of from 1½ to 3 fathoms (2^{m}7 to 5^{m}5), lying as much as 1½ miles offshore.

Chart 3858, plan of Approaches to Benkulen.

Approaches to Benkoelen.—Islet.—Light.—Dangers.—Buoy.—Soengai (Sungai) Limau, a shoal with a depth of 2 fathoms (3^{m}7), is the northernmost danger in the approach to Benkoelen, and is situated 1½ miles south-westward of Ujong Parit. Between this shoal and Benkoelen there are several shoals with depths of from 1½ to 3 fathoms (2^{m}7 to 5^{m}5).

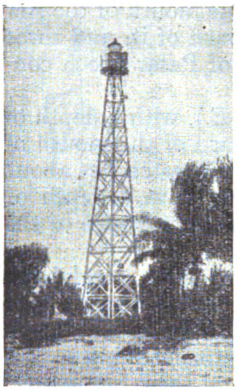
Chart 3858, plan of Benkulen road.

Pata Sambilan, a reef which dries, lies 1¼ miles west-north-westward of the southern entrance point of the roadstead, with another reef between; the sea does not always break on these reefs, but as it is liable to do so without warning, boats should not attempt to cross them; between these reefs there is a channel with a least depth of 3½ fathoms (6^{m}4).

A white conical buoy, surmounted by a ball, is moored about 3 cables north-north-eastward of Pata Sambilan.

Chart 3858, plan of Approaches to Benkulen.

Tikoes (Tikus), a low, densely wooded islet, stands on a large drying reef, 5 miles south-westward of Benkoelen.



Tikoes lighthouse.

(Original dated prior to 1924.)

A light (*Lat. 3° 50′ S., Long. 102° 11′ E.*) is exhibited, at an elevation of 106 feet (32^{m}3), from a red and white iron framework tower, 98 feet (29^{m}9) in height, on Tikoes.

Karang Bayan, with a least depth of 4½ fathoms (8^{m}2), lies about 2½ miles westward of Tikoes, with Karang Ikan Tandoe, with a depth of 7 fathoms (12^{m}8), about half a mile north-eastward of the reef. Between Karang Bayan and the reef extending westward from Tikoes is a 4-fathom (7^{m}3) patch, and another 4-fathom (7^{m}3) patch lies half a mile eastward of Tikoes.

Middle shoal, with a least depth of 4 fathoms (7^{m}3), lies about 2 miles southward of Benkoelen and 1½ miles offshore.

Lampoejang (Lampuyang), a sunken reef, lies about 3½ miles southward of Benkoelen, and 1¾ miles offshore. It is usually marked by breakers. A 4½-fathom (8^{m}2) patch lies about three-quarters of a mile southward of Lampoejang, and a 3½-fathom (6^{m}4) patch half a mile westward.

Lebar rif, with a least depth of 3½ fathoms (6^{m}4), lies about 3½ miles west-south-westward of Ujong Telok Poenggoer (Punggur) or Buffalo

Charts 2780, 2781, 2760, 748b.

Chart 3858, plan of Approaches to Benkulen.

point, a low point situated 7¾ miles southward of Benkoelen. This reef is nearly always marked by breakers.

Chart 3858, plan of Benkulen road.

Reede Benkoelen.—Lights.—Dangers.—Buoy.—The limits of the roadstead are the parallels of lat. 3° 46′ S. and lat. 3° 48′ 30″ S. and the meridian of longitude through Ujong Parit.

Reede Benkoelen affords good anchorage north-westward of the settlement. Benkoelen rivier discharges about 1¼ miles north-north-eastward of the settlement; Pasar Benkoelen stands on the southern side of the entrance. There is a shallow bar at the entrance, but inside there are depths of from 8 to 12 feet ($2^{m}4$ to $3^{m}7$).

A light is exhibited from a white iron framework structure, 20 feet ($6^{m}1$) in height, about 2¾ cables north-eastward of the entrance to the river.

A boat harbour, formed by two breakwaters, is situated on the northern side of the settlement; it has a depth of about 2 feet ($0^{m}6$). There is a crane on the quay.

A light is exhibited, at an elevation of 23 feet ($7^{m}0$), from a white iron column, 20 feet ($6^{m}1$) in height, from the head of each breakwater.

A reef extends about 2½ cables westward and 3 cables north-westward from the point, abreast the settlement, and a 2½-fathom ($4^{m}6$) patch lies about 4 cables westward of the same point. A shoal, with a depth of 3 feet ($0^{m}9$), lies 2¼ cables north-westward of the boat harbour light structures, and is marked on its western side by a black can buoy, surmounted by a truncated cone.

Chart 3858, plans of Benkulen road and its approaches.

Anchorage.—Directions.—The best anchorage is just outside the buoy marking the 3-foot ($0^{m}9$) patch north-westward of the boat harbour, with good holding ground of mud and sand, in a depth of about 4½ fathoms ($8^{m}2$). With any swell the sea breaks a short distance outside the entrance to the boat harbour.

North-eastward of Benkoelen the land is high and rugged; Boengkoek (chart 2780) is a noticeable mountain from some directions. *See* view facing page 359.

The roadstead may be easily identified by the clump of casuarina trees in the settlement, showing above everything. The mouth of the river is not easily identified, the fort and the roofs of a few houses being the only objects visible from any distance seaward.

Approaching from westward, the trees on Tikoes (*Lat. 3° 50′ S., Long. 102° 11′ E.*) will be seen before Boengkoek can be identified, which is more noticeable on a nearer approach. By night, a vessel should keep in the *white* sector of the light at the mouth of the Benkoelen rivier, between the bearings of 080° and 105°.

Approaching from southward either by day or night, a vessel may pass between Ujong Telok Poenggoer and Lebar rif, thence between Tikoes and Middle shoal, thence into the *white* sector of the Benkoelen rivier light, and thence to the anchorage.

North-westerly winds, which prevail from October to March, when strong, cause a heavy sea and breakers in the roadstead; during the South-east monsoon the roadstead is safe.

Chart 3858, plan of Benkulen road.

Benkoelen.—Benkoelen, the capital of the Benkoelen district, stands on undulating ground, 4½ miles southward of Ujong Parit; it

Chart 3858, plan of Benkulen road.

was almost entirely destroyed, in 1914, by an earthquake, but has since been rebuilt. It is the headquarters of an Administrator. Fresh provisions may be obtained. The population, in 1945, was about 13,000.

There is regular communication by steamer with other ports in Sumatra.

Chart 3858, plan of Approaches to Benkulen.

Coast.—Poelau (Pulau) baai, entered 3½ miles north-eastward of Ujong Telok Poenggoer, is a landlocked harbour, but its entrance has silted up and is no longer available as an anchorage. Selebar rivier discharges into the bay.

The coastal bank, with depths of less than 6 fathoms (11^{m}0), extends about 6 cables north-westward and westward from Ujong Telok Poenggoer. Ujong Genting, a low point, lies 2¾ miles southward of Ujong Telok Poenggoer.

Chart 2781.

From Ujong Genting to Vlakke hoek, about 180 miles south-eastward, the coast is almost entirely without shelter, and owing to heavy surf the few frequented places are dangerous for landing. It is in most places bold and safe to approach, and the land is mountainous a short distance inland. The points between Benkoelen and Baai van Kroë, about 130 miles south-eastward, are generally low and distinguishable by darker colouring than that of their surroundings.

Aspect.—Dempo, an active volcano, 10,364 feet (3158^{m}9) high, lies about 30 miles north-eastward of Manna (*see* below). Dingin, 6,628 feet (2020^{m}2) high, and a mountain, 7,303 feet (2225^{m}9) high, lie about 11 miles westward and 13 miles southward, respectively of Dempo, and Patah, 9,242 feet (2817^{m}0) high, about 17½ miles south-south-eastward of the same mountain. Bepagoet, 8,963 feet (2731^{m}9) high, lies 12 miles south-eastward of Patah. These are all useful marks for identifying the locality. *See* view facing this page.

Coast.—Between Ujong Genting and Manna, 49 miles south-eastward, there are regular depths over a sandy bottom outside a distance of 2 miles offshore ; farther south-eastward the coast becomes more steep, and the coastal bank becomes a narrow strip, until Betoea, an island off Vlakke hoek, is approached, where it extends 8 miles offshore.

About 35 miles south-eastward of Ujong Genting (*Lat. 3° 58′ S., Long. 102° 17′ E.*) is Pasar Alas, a small village. A shoal, with a depth of 2½ fathoms (4^{m}6), lies about 1½ miles west-south-westward of the village, and a 3¼-fathom (5^{m}9) patch about 2½ miles west-north-westward ; both are usually marked by breakers.

Between Pasar Alas and Manna, the coast is fronted by several shoals, with depths of from 1½ to 3 fathoms (2^{m}7 to 5^{m}5), lying within 2 miles offshore ; they are usually marked by breakers. Pasar Pinoh stands on the coast about 6 miles north-north-westward of Manna.

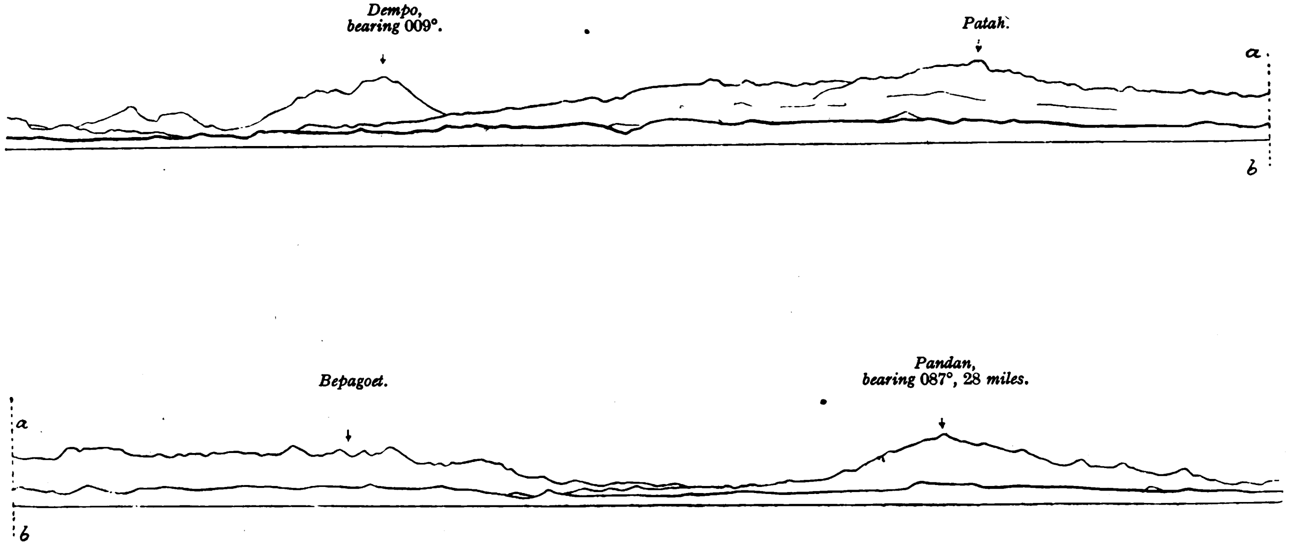
Chart 3858, plan of Manna road.

Reede Manna.—**Light.**—Reede Manna, situated off Tanjong Manna and the town of Manna, affords only a temporary anchorage, as it is exposed to the swell, and is not recommended. Tanjong Manna is densely wooded and may be identified by a hillock covered with coconut palms. The coastal bank, with depths of less than 6 fathoms (11^{m}0), extends 1½ miles south-westward from the point.

A light is exhibited, at an elevation of 49 feet (14^{m}9), from a white

Charts 2760, 748b.

To face page 362.



View, in two parts, of south-eastern approach to Reede Manna.

(*Original dated* 1921.)

Chart 3858, plan of Manna road.
iron framework structure, 46 feet (14^{m}0) in height, on Tanjong Manna.

The town, which stands in the bight close north-eastward of the point, is noticeable. A cascade falls vertically from the steep cliffs which border the coast near the town.

Landing is only possible in fine weather, and then only northward of the light structure.

Vessels may obtain anchorage about one mile offshore, with the light structure bearing between 045° and 090°.

Chart 2781.

Coast.—Between Tanjong Manna and Padang Goetji (Guchi), a village situated about 15 miles south-eastward, there are some shoals with depths of 3 and 3½ fathoms (5^{m}5 and 6^{m}4), lying about 1½ miles offshore, the positions of which can be seen on the chart.

Chart 3858, plan of Sambat bay or Bintuhan road.

Sambat baai.—Lights.—Sambat baai or Reede Bintoehan (Bintuhan) is entered between Tanjong Bandar, a low point covered with high trees, situated about 33 miles south-eastward of Tanjong Manna, and Tanjong Linau, about 5 miles farther in the same direction.

On the north-western side of the bay is the settlement of Bandar, which is the headquarters of an Administrator, and on the south-eastern side is Linau.

The limits of the roadstead are the meridian of long. 103° 20′ E. and the parallel of lat. 4° 49′ 30″ S.

A light is exhibited, at an elevation of 47 feet (14^{m}3), from a white iron framework structure, 46 feet (14^{m}0) in height, on Tanjong Bandar.

A light is occasionally shown from the Custom house flagstaff.

Anchorages.—Directions.—Anchorage may be obtained in Sambat baai, north-eastward of Tanjong Bandar (*Lat. 4° 49′ S., Long. 103° 21′ E.*), in a depth of 8 fathoms (14^{m}6), sand and mud, with the Custom house flagstaff bearing 316°, and the light structure on Tanjong Bandar, 225°.

Anchorage may also be obtained off Linau.

Vessels approaching Sambat baai from north-westward should give Tanjong Bandar a berth of one mile, and approach the anchorage with the Custom house flagstaff bearing 316°. Approaching from south-eastward, a vessel may pass close to Tanjong Linau.

The landing place is on the north-eastern side of the entrance to the creek at Bandar.

There is regular communication by steamer with other ports in Sumatra.

Chart 2781.

Coast.—Dangers.—The coast between Tanjong Linau and the northern entrance point of Baai van Kroë, about 32 miles south-eastward, is mostly steep-to, and indented by several bays which are open south-westward.

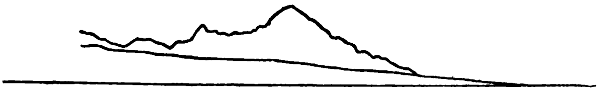
From Tanjong Merpas, a noticeable headland, situated about 8 miles south-eastward of Tanjong Linau, rocky foul ground, on which the sea breaks heavily, lies within 2 miles south-south-eastward, and a 4¼-fathom (7^{m}8) patch lies one mile west-south-westward of the headland; a rocky spit extends about one mile offshore from a point situated about 5 miles north-north-westward of Pisang, an island situated at the northern end of Baai van Kroë.

Charts 2760, 941a, 1263, 748b.

Chart 2781.

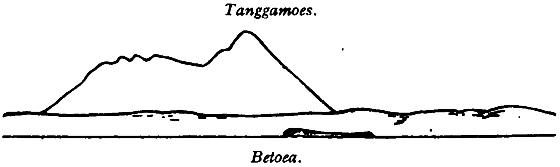
Landing may be effected at the villages of Lemong and Penengahan, in the north-western and south-eastern corners, respectively, of Poegoeng (Pugung) baai, which lies on the eastern side of Ujong Tandjoeng (Tanjung), about 17 miles south-eastward of Tanjong Linau.

Aspect.—Pandan, a mountain, 5,942 feet (1811^{m}1) high, lies about 17 miles north-eastward of Tanjong Bandar. Poegoeng (Pugung), a mountain, 6,444 feet (1964^{m}1) high, lies about 12 miles eastward of Ujong Tandjoeng. About 18 miles east-north-eastward of Poegoeng is Pasagi, 7,323 feet (2232^{m}0) high, and about 15 miles south-eastward of Pasagi is Sekintjau (Sekinchau), 5,637 feet (1718^{m}2) high. Tanggamoes, 6,896 feet (2101^{m}9) high, lies near the head of Semangko baai, 29 miles south-eastward of Sekintjau.



Poegoeng, bearing 115°.

(*Original dated* 1929.)



Tanggamoes, bearing 028°.

(*Original dated* 1929.)

Chart 3858, plan of Kroë bay.

Baai van Kroë.—Dangers.—Lights.—Baai van Kroë is entered between a point 14½ miles south-eastward of Ujong Tandjoeng and Ujong Walor, about 7 miles south-south-eastward.

Pisang, a densely wooded island, fringed by a narrow reef, lies nearly one mile south-westward of the northern entrance point, with depths of from 2 to 3 fathoms (3^{m}7 to 5^{m}5) between. A shoal, with a least depth of 3 feet (0^{m}9), lies one mile north-north-westward of the northern extremity of Pisang.

A light is exhibited, at an elevation of 247 feet (75^{m}3), from a white iron framework structure, 102 feet (31^{m}1) in height, on the eastern side of Pisang (*Lat. 5° 07′ S., Long. 103° 51′ E.*).

The limits of the roadstead are imaginary lines drawn in 143° and 045° directions from the south-western and north-western extremities, respectively, of Pisang.

Ujong Walor is a low point which may be identified by its dark coloured vegetation. A reef extends about a quarter of a mile from the point, and a spit, with a depth of 2 fathoms (3^{m}7) near its outer end, extends 8½ cables north-westward from the coast about half a mile northward of Ujong Walor.

A reef, which is steep-to, with a depth of one fathom (1^{m}8) over its outer end, extends about 2 cables south-westward from Tanjong Saloboe, situated about 2½ miles north-eastward of Ujong Walor.

A light is exhibited, at an elevation of 113 feet (34^{m}4), from a white iron framework structure, 42 feet (12^{m}8) in height, on Tanjong Saloboe.

Charts 2760, 941a, 1263, 748b.

Chart 3858, plan of Kroë bay.

Lights are shown, at an elevation of 14 feet (4^m3), on each side of the entrance to the boat camber at Kroë.

Gosong Karang Djati (Jati), a coral reef with a depth of 1½ fathoms (2^m7), lies 8½ cables northward of Tanjong Saloboe, and 4½ cables offshore and is marked by continuous surf. A rock, with a depth of less than 6 feet (1^m8), lies 3 miles northward of Tanjong Saloboe, and 4½ cables offshore.

Anchorages.—Directions.—Large vessels may obtain anchorage, in a depth of about 10 fathoms (18^m3), hard sand, off Kroë, about 2 cables northward of the light structure on Tanjong Saloboe. This is a safe anchorage during the South-east monsoon.

With north-westerly winds, vessels may obtain anchorage eastward of Pisang, in a depth of about 8 fathoms (14^m6), sand.

Approaching from north-westward, Pisang may be rounded by eye, and from south-eastward, Ujong Walor should be given a berth of one mile. Poegoeng is a good mark when approaching Baai van Kroë.

Kroë.—Kroë town is situated on the banks of a small river, which is inaccessible, flowing out close eastward of Tanjong Saloboe.

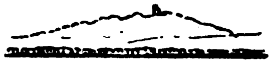
There is a boat camber with a depth of 3 feet (0^m9), and a hand crane.

Kroë is the headquarters of an Administrator.

There is regular communication by steamer with other ports in Sumatra.

Chart 2781.

Coast.—Dangers.—Pematang Langgar, 1,440 feet (438^m9) high, with a noticeable tree on its summit, is the only prominent peak between Ujong Walor and Ujong Siging, about 26 miles south-eastward; it lies about 6½ miles north-north-eastward of Ujong Siging.



Pematang Langgar.
(*Original dated* 1929.)

Between Baai van Kroë and Vlakke hoek the coast is low and densely wooded, and is bordered by a narrow sandy beach. The district is thinly populated.

Chart 3858, plan of Labuan Tapokan.

Laboean (Labuan) Tapokan is entered between Ujong Walor (*Lat. 5° 13' S., Long. 103° 54' E.*) and Ujong Tapokan, about 7½ miles south-eastward.

A coral reef, with a depth of 2¼ fathoms (4^m1), and on which the sea always breaks, lies near the middle of the bay, about 1¼ miles offshore.

Anchorage may be obtained off Pager Dalem village, on the south-eastern side of the bay, where landing is always possible, except during continuous north-westerly winds.

Chart 2781.

Laboean Djamboe (Labuan Jambu), entered between Ujong Tapokan and Ujong Karang Pinggang, about 3 miles south-eastward, is clear of dangers, but it is an exposed anchorage.

Chart 3858, plan of Labuan Siging.

Laboean (Labuan) Siging lies on the northern side of Ujong Siging.

A shoal, with depths of from 4½ to 5¼ fathoms (8^m2 to 9^m6), lies

Chart 3858, plan of Labuan Siging.

about 3½ miles north-westward of Ujong Siging, and about 1¼ miles offshore; there is often a heavy swell over this and other shoals south-south-eastward of it. Ujong Siging is fringed by a reef which extends about 3 cables offshore, and a spit with depths of less than 5 fathoms ($9^{m}1$), extends about 1½ miles south-eastward.

Anchorage may be obtained, in depths of from 5 to 6 fathoms ($9^{m}1$ to $11^{m}0$), sand, with Ujong Siging bearing 170°, well sheltered from the south-easterly and southerly swell.

Chart 3858, plan of Bengkunat bay.

Bengkoenat baai.—Dangers.—Bengkoenat (Bengkunat) baai lies on the northern side of Ujong Tjoekoe Batoe (Chuku Batu) Beragam, situated about 8 miles south-south-eastward of Ujong Siging. It is the only good anchorage between Kroë and Vlakke hoek.

There is a conspicuous tree 1¼ miles eastward of Ujong Tjoekoe Batoe Beragam.

A rock, with a depth of 3 feet ($0^{m}9$) on which the sea always breaks, lies about 1½ miles north-north-westward of Ujong Tjoekoe Batoe Beragam, and a 2½-fathom ($4^{m}6$) patch, on which the sea seldom breaks, lies 5½ cables northward of the same point. A shoal, with a least depth of 3¼ fathoms ($5^{m}9$), on which the sea usually breaks, lies about 1½ miles south-westward of Ujong Tjoekoe Batoe Beragam.

Landing is possible inside Ujong Tjoekoe Batoe Beragam, even during north-westerly winds.

The mouth of the small river discharging into the bay silts up with sand during the dry season, and forms marshy ground. At other times the muddy water from the river extends some distance seaward.

Anchorage.—Directions.—Anchorage may be obtained north-eastward of Ujong Tjoekoe Batoe Beragam, in depths of from 4½ to 5 fathoms ($8^{m}2$ to $9^{m}1$).

A vessel should approach the bay on an easterly course, passing about 3 cables southward of the 3-foot ($0^{m}9$) patch; when the conspicuous tree bears 131° she should steer for it on that bearing, and anchor when Ujong Tjoekoe Batoe Beragam bears 225°.

Charts 2056, 2781.

Coast.—Dangers.—The coast between Bengkoenat baai and Vlakke hoek (*Lat. 5° 55′ S., Long. 104° 33′ E.*) is mostly low, but inland it is hilly, Langgar, 518 feet ($157^{m}9$) high, 6½ miles northward of Vlakke hoek lighthouse, being the most conspicuous summit.

A 5½-fathom ($10^{m}1$) patch lies about 3 miles south-south-westward of Ujong Tjoekoe Batoe Beragam, and a 6-fathom ($11^{m}0$) patch about 5½ miles southward of the same point, and 3½ miles offshore.

A shoal, with a depth of 3¾ fathoms ($6^{m}9$), lies 7½ miles north-westward of Vlakke hoek lighthouse, and about 2¼ miles offshore. A 2¾-fathom ($5^{m}0$) patch lies about 6 miles north-north-westward of the lighthouse and nearly one mile offshore. A 2-fathom ($3^{m}7$) patch lies about 4 miles north-north-westward of the lighthouse and about 1¾ miles offshore.

Chart 3858, plan of Balimbing bay.

Balimbing baai.—Balimbing baai lies on the northern side of Vlakke hoek; its shores are fringed by a bank, with depths of less than 3 fathoms ($5^{m}5$), extending from 2 to 3 cables offshore.

A shoal, with a least depth of 3½ fathoms ($6^{m}4$), lies about 2 miles

Chart 3858, plan of Balimbing bay.

north-north-westward of Ujong Tjoekoe (Chuku) Balimbing, the southern entrance point of the bay.

Anchorage may be obtained, in a depth of 4½ fathoms (8^{m}2), sand, with Vlakke hoek lighthouse bearing 192°, and the entrance to the river, which lies about 1¾ miles north-eastward of the lighthouse, bearing 084°.

Charts 3858, plan of Balimbing bay, 2056.

Vlakke hoek.—Light.—Vlakke hoek or Flat cape is the south-western extremity of Benkoelen peninsula, and is situated on the northern side of the western entrance to Straat Soenda (Sunda).

Approaching the cape in thick weather the soundings are a good guide, but it is not advisable to get into a depth of less than 20 fathoms (36^{m}6).

A light is exhibited, at an elevation of 205 feet (62^{m}5), from a white iron tower, 190 feet (57^{m}9) in height, on Vlakke hoek (*Lat. 5° 55′ S., Long. 104° 33′ E.*).

Chart 2056.

Off-lying island.—Betoea or Little Fortune island, about 6½ miles westward of Vlakke hoek, is low and wooded, and fringed by a reef; there is a village on its north-eastern side.

The 10-fathom (18^{m}3) bank on which the island lies, extends 3½ miles south-eastward, and 3 miles north-westward from the island, and the sea breaks on it in places.

For continuation of the coast eastward, *see* Eastern Archipelago Pilot, Vols. II and IV.

Charts 2781, 2760, 941a, 1263, 748b.

APPENDIX I

SINGAPORE PORT REGULATIONS.

RULES FOR THE PORT OF SINGAPORE MADE BY THE GOVERNOR IN COUNCIL UNDER SECTIONS 391 AND 434 OF ORDINANCE NO. 125 (MERCHANT SHIPPING), AND APPROVED BY RESOLUTION OF THE LEGISLATIVE COUNCIL ON THE 28TH OCTOBER, 1929.

1.—These Rules may be cited as " The Singapore Port Rules 1936 " and shall apply only to the Port of Singapore.

2.—In these Rules :—

(*a*) " Port limits " means the limits set out in the order of the Governor in Council in Part I hereof declaring the Port of Singapore.

(*b*) " Collision Regulations " means the regulations for the prevention of collisions at sea under section 418 of " The Merchant Shipping Act, 1894."

(*c*) " Steam vessel " includes any vessel propelled by machinery.

(*d*) " Asiatic craft " shall include junks and native vessels of every description other than steam vessels.

(*e*) " Harbour craft " shall include steam and motor launches, junks, tongkangs, twakos, lighters, vessels in tow, yachts, boats, sampans, dredgers and rafts.

" Dangerous Cargo " means aquafortis, vitriol, naphtha, benzine, gunpowder, lucifer matches, nitroglycerine, petroleum, any explosives within the meaning of the Arms and Explosives Ordinance (Chapter 196) and any other goods which are of a dangerous nature.

3.—Every vessel under oars or sail of less than 20 tons, gross tonnage shall, when within port limits between sunset and sunrise, either exhibit the lights prescribed by the Collision Regulations under Section 418 of the " The Merchant Shipping Act, 1894," or be provided with a lantern showing a bright *white* light, which shall be exhibited on the approach of, or when approaching, any other vessel in sufficient time to prevent collision.

Man-of-War Anchorage.

4.—(*a*). The anchorage reserved for men-of-war shall be within a rectangle the northern corner of which, (*a*), is situated in a position 6·7 cables, 103°, from the *red* light on the northern end of the Detached mole ; the eastern corner, (*b*), is situated 9 cables, 135°, from (*a*) ; the southern corner (*c*), is situated 6 cables, 225°, from (*b*) ; the western corner, (*d*), is situated 9 cables, 315°, from (*c*).

(*b*). The man-of-war anchorage normally will be kept clear, but should it be necessary to do so, and on the understanding that they will shift billet on due notice being given that it is required by His Majesty's Ships, merchant ships may use it in the absence of His Majesty's ships.

Quarantine Anchorages.

5.—(*a*) The principal Quarantine anchorage shall be northward of and within one mile and a quarter of Peak island, with the centre of Peak island between the bearings of 152° and 201°.

(*b*) An alternative Quarantine anchorage westward of Blakang Mati, shall be as follows :—For a distance of 9·9 cables 246° from the beacon on Palawan reef, thence one mile 156°, thence 1·7 miles 066°, thence back to the beacon on Palawan reef following the reef off the south-western side of Blakang Mati.

This anchorage shall be used in bad weather only, during the period of the North-east monsoon.

Explosives Anchorages.

6.—The anchorages for vessels loading or loaded with explosives shall be as follows :—

(*a*) *Western Explosives Anchorage,* Blakang Mati. An anchorage westward of Blakang Mati and northward of the alternative Quarantine anchorage, bounded as follows :—

(i) For a distance of 3·8 cables 246° from a position situated 4·0 cables, 246°, from Tanjong Rimau (N.W. extremity of Blakang Mati).

(ii) Thence 6·4 cables, 156°.

(iii) Thence 7·0 cables, 066°.

(iv) Thence 7·1 cables 309° to (i).

(*b*) *Eastern Explosives Anchorage, Singapore road.* An alternative anchorage shall be as follows :—

(i) On the north by a line drawn in a 090° direction for a distance of 9 cables from a point 090°, 15 cables from the *flashing red* light on the northern end of the Detached mole.

(ii) On the east by the eastern harbour limit as defined in Part I of these Rules.

(iii) On the south by a line drawn in a 090° direction from the *flashing green* light on the southern end of the Detached mole.

(iv) On the west by a line drawn in a 180° direction from a point 090°, 15 cables from the *flashing red* light on the northern end of the Detached mole.

(2) *The Eastern Explosives Anchorage.*—This anchorage shall ordinarily be used only by vessels carrying, loading or discharging small quantities of explosives.

(3) (*a*) Vessels carrying, loading or discharging explosives shall not anchor or berth within port limits elsewhere than at the above anchorages without permission in writing from the Port Officer.

(*b*) All such vessels shall hoist by day the International code signal Flag " B " at the mast-head ; by night a *red* light shall be exhibited in the same place.

Dangerous Petroleum Anchorage.

7.—(1) The anchorage for vessels carrying Dangerous Petroleum Ordinance (Chapter 211) (flash point below 73° Fahrenheit) shall be limited as follows :—

(i) On the north by a line extending two miles from the north-western end of Pulau Bukum towards the north-western end of Blakang Mati.

(ii) On the west by the islands and reefs of Pulau Bukum and Pulau Sebarok.

(iii) On the south by a line extending one mile from the south-eastern end of Pulau Sebarok towards the Terembu Selegi beacon.

(iv) On the east by a line joining the eastern limits of the northern and southern boundaries.

(2) Such vessels shall not anchor or berth elsewhere within port limits, except with the permission in writing of the Port Officer.

Prohibited Anchorages.

8.—(i) The following area in Singapore Outer roads is a Cables Prohibited anchorage :—

From a line drawn in a 315° direction from the north-eastern corner of the Eastern Explosives anchorage to the shore, thence in an easterly direction following the low water mark to the white obelisk at Siglap, and thence in a line drawn in a 214° direction to the north-eastern corner of the Eastern Explosives anchorage.

(ii) The following area in Keppel harbour is a Cables Prohibited anchorage :—

In the water, southward of and between two notice boards situated on the northern shore between Section X and St. James' power station. These notice boards are marked respectively " Cables—anchorage prohibited eastward of " and " Cables—anchorage prohibited westward of."

(iii) The following area in the western approach to Keppel harbour is a Cables Prohibited anchorage :—

Northward of a line joining Cyrene reefs light-beacon and Kubu Batu Berlayar.

9.—No Harbour craft other than those belonging to the Government Monopolies Department are to make fast to the sea wall, or lie at anchor off it, for a distance of 25 yards from the Monopolies Building on the south side of Clifford pier.

10.—No vessel or raft shall anchor in the fairway through Keppel harbour except in case of emergency or with the permission in writing of the Port Officer.

11.—(*a*) No vessel or raft shall in any circumstances anchor in the locality of the submarine telephone cables extending in a south-easterly direction from Labrador and passing close westward of the western entrance to Keppel harbour.

(*b*) With the exception of vessels using the Eastern Explosives Anchorage no unauthorised vessel or raft shall anchor or remain within the area eastward of a line drawn from the *flashing red* light on the western side of the entrance to the approach channel and anchorage for marine aircraft to the eastern corner of the Man-of-War Anchorage and thence in a 180° direction to the eastern Harbour Limit.

Anchorages for Asiatic craft.

12.—The anchorages for Asiatic craft shall be within areas bounded by :—

(1)—(*a*) A line drawn in an 090° direction from the *green* light at the entrance to Singapore river.

(*b*) A line from the *red* light on the northern end of the Detached mole to beacon No. 27.

(*c*) A line drawn in a 270° direction from beacon No. 27.

(2)—(*a*) On the west by a line drawn in a 180° direction from the western extremity of Tanjong Ru.

(*b*) On the east by a line drawn in a 180° direction from the Singapore swimming club.

(*c*) Within 4 cables length of the shore.

Access to slipways on Tanjong Ru must always be kept clear.

Vessels Laying Up, etc.

14.—(1) No vessel undergoing repairs or laying up shall occupy a loading or discharging berth.

(2) The preceding sub-section shall not apply in the case of the wharves and docks of the Singapore Harbour Board.

Regulating Traffic, Keeping Free Passages, etc.

15.—A free passage way, not less than two cables in width, shall be kept off each end of the Detached mole. No vessel shall anchor in or otherwise obstruct such passage way.

16.—(1) Harbour craft shall not cross the bows or otherwise impede the movements of any sea-going steam vessel under way in Singapore Inner roads or Keppel harbour, but shall give such vessel as wide a berth as possible, provided that this rule shall not relieve the Pilot or Master of a sea-going steam vessel from his duty to prevent a collision or accident whenever possible.

(2) Subject to the provisions of the preceding sub-section, it shall be lawful for boats, for the purpose of loading or unloading, to make fast alongside any steam vessel in waters situated in the Inner roads, within the limit of the Detached mole, in lines not exceeding the length of the steam vessel, and in ranks not exceeding four boats abreast.

(3) The provisions of sub-section (2) shall apply to boats lying alongside steam vessels berthed at the wharves of the Singapore Harbour Board; provided that in the case of steam vessels berthed at the south and east walls of the Empire dock, it shall be lawful for boats to lie more than four abreast.

17.—No vessel shall enter or remain within any area which has been or may be declared to be a firing-ground under section 9 of the Military Manœuvres Ordinance (Chapter 103) while any act specified in section 11 (1) (*a*) of the said Ordinance is being performed. Any vessel then within such area, directed to remove by the Port officer, or by any Naval, Military, or Police officer, shall do so without undue delay.

18.—(1) Every vessel navigating in Keppel harbour shall proceed at a speed not exceeding 6 knots, except temporarily in case of emergency, and shall take all reasonable care not to endanger life or property belonging to or adjacent to any wharf or dock.

19.—(1) When small craft or rafts navigating in Keppel harbour find it necessary to anchor they shall do so well inshore.

(2) Vessels towing in Keppel harbour shall not tow more than two vessels abreast by four vessels in line: provided that this sub-section shall not apply to high-power tugs which are owned or used by the Singapore Harbour Board.

20.—No vessel shall anchor in or otherwise obstruct the fairway of any river within port limits or make fast to or under any bridge.

21.—(1) Free passages shall be kept to all piers, jetties, wharves, landing-places, docks, rivers and moorings and all vessels and rafts shall move without delay when so directed by the Port officer, or by any Police officer. A clear space of 20 fathoms shall be preserved in front of and around all landing-places, except those situated on the bank of a river.

(2) No vessel shall occupy the same berth continuously for more than 96 hours, without the permission of the Port officer in writing, provided that this sub-section shall not apply to vessels lying at privately-owned wharves.

(3) The provisions of sub-sections (1) and (2) shall not apply to vessels lying at the wharves and docks of the Singapore Harbour Board.

22.—No vessel shall anchor so as to swing within 50 fathoms of Clifford pier.

23.—Steam vessels when navigating rivers or channels or going alongside any jetty, pier, ladder, dock entrance, wharf, or ship, shall navigate at a slow rate of speed.

24.—No vessel (unless of H.M. Service or in the employ of Government) shall come alongside any public stairs or pontoons until the persons for whom she is waiting arrive. When directed by the Port officer or by a Police officer such vessel shall move without undue delay.

25.—(1) No vessel shall remain alongside any public stairs, pontoon, jetty or landing-place longer than is necessary to embark or disembark passengers, except with the permission of the Port officer. When directed by the Port officer or by a Police officer such vessel shall move without undue delay.

(2) No boatman or any other person shall assist in bringing a boat alongside any vessel, or board any vessel on her arrival in port, until such vessel be properly anchored or moored.

(3) No vessel may occupy a berth alongside except for the purpose of either loading or discharging cargo.

(4) Every vessel occupying a loading or discharging berth shall commence loading or discharging cargo within six hours of her arrival alongside.

(5) The provisions of sub-sections (3) and (4) shall not apply to vessels lying at privately-owned wharves or at the wharves and docks of the Singapore Harbour Board.

26.—No passenger shall land, and no person in charge of any launch, boat or sampan shall set down any passenger or the baggage of any passenger or other person between Tanjong Pagar East wharf and Tanjong Katong, except at the following places :—

Within the enclosed area at and adjacent to Telok Ayer basin.
Clifford pier.
Treasury steps (Singapore river).
Middle Road Landing Place (by Volunteer Drill Hall).
Arab Street steps (at Clyde Terrace).
Esplanade.

For the purposes of this Rule the expression " passenger " shall include every person conveyed or being conveyed to the shore in any launch, boat or sampan (not being the Master or a member of the crew thereof), from on board any vessel within or without the limits of the port, except from on board any vessel lying in the Singapore river or in the area situated to the northward of a line joining Tanjong Ru and Clyde Terrace Market.

27.—(1) No cargo shall be landed and no person in charge of any launch, boat or sampan shall unload cargo except at the following approved landing places :—

(i) Landing places situated on lands in the occupation of the Singapore Harbour Board ;
(ii) Telok Ayer basin ;

(iii) Landing places in the Kalang and Rochore rivers, including Tanjong Ru ;
(iv) Crawford Street ;
(v) Beach Road, including (a) Hylam Kongsi, (b) Clyde Terrace ;
(vi) Singapore river generally.

(2) The use of landing places enumerated in paragraph (1) (i) and (ii) is subject to charges gazetted under the Ports Ordinance (Chapter 149).

(3) The landing places enumerated in paragraph (1) (iii) to (vi) are free landing places save that, in accordance with the order published as *Gazette* Notification No. 485 of 1933, a charge of 30 cents per head is made for landing cattle at Hylam Kongsi.

28.—No person shall board or disembark from any ship which is arriving, or has arrived alongside any wharf, pier, or jetty, or any vessel anchoring in the harbour, until such ship is properly secured alongside, or properly moored, nor otherwise than by the gangway or other regular means provided for the purpose.

29.—The master of every vessel anchoring in the harbour or going alongside any wharf, pier or jetty shall prevent all cargo on his vessel from being unloaded until such vessel is properly anchored or properly secured alongside or properly moored as the case may be.

30.—(1) (*a*) No person shall loiter on any public pier within port limits.

(*b*) No person shall tout for hire, sell, hawk or peddle on any Public pier within port limits.

(2) Any person found contravening this rule shall immediately leave the pier when so directed by any Police officer or by an Officer of the Marine Department, or, as regards Clifford pier, the Pier-master of the Singapore Harbour Board.

Prohibition of Landing on Detached mole.

31.—No person shall, without the permission of the Port officer, land on the Detached mole or make fast any vessel or raft thereto.

Making Fast to Buoys, etc.

32.—No person shall make fast any vessel or raft to any navigational buoy or beacon.

33.—(1) Vessels alongside wharves or piers shall carefully attend to their securing hawsers especially when other vessels are passing and during the rise and fall of the tide.

(2) Masters of vessels berthed in Keppel harbour shall pay particular attention to this order.

Steam Whistles, Syrens, etc.

34.—No steam whistle, syren, or other like instrument shall be used within port limits except as a signal of danger or in conformity with the Collision Regulations.

General Directions for Vessels Arriving and Departing.

35.—(1) The Master of every steam vessel about to depart from the port shall cause the Blue Peter (Flag " P ") to be displayed during daylight for at least two hours before the time of sailing, or if this is not practicable for as long before departure (during daylight) as may be possible.

(2) No ship shall berth or unberth at the Singapore Harbour Board wharves between 1830 and 0530 without first obtaining permission from the Singapore Harbour Board.

(3) The provisions of sub-sections (1) and (2) shall not apply to such tugs and launches owned or used by the Singapore Harbour Board as it may be necessary to despatch in the interest of vessels in danger or distress outside port limits.

36.—The Master or Owner of every vessel carrying or about to carry dangerous cargo or explosives shall in each case notify the Port officer of the nature, quantity, and mode of stowage of such cargo.

37.—(*a*) The Master of every vessel loaded with, or being loaded with dangerous cargo or explosives shall anchor or moor at such place as the Port officer may direct and shall not move his vessel therefrom, except for the purpose of leaving the port, without the written permission of the Port officer.

(*b*) Explosives shall be loaded or unloaded only between 0530 and 1830.

(*c*) No vessel carrying explosives shall be moved between 1830 and 0530 within or through the limits of Keppel harbour, the Inner roads, Telok Ayer basin or the Singapore, Gelang or Kalang rivers.

(*d*) Subject to (*c*) above no vessel carrying explosives shall be moved within or through the limits of Keppel harbour, the Inner roads or the Telok Ayer basin except with the written authority of the Port officer.

39.—No oil of any description shall be discharged or allowed to escape, and no ashes, rubbish or other nuisance, likely to be detrimental to shipping, or to pollute the harbour, shall be discharged or thrown overboard within port limits.

40.—(1) The application for a clearance under section 399 of the Merchant Shipping Ordinance shall be made not less than 6 hours before the proposed time of sailing. If such clearance be not made use of within 48 hours, the same shall be returned to the Port officer for cancellation.

(2) The provisions of sub-section (1) will not be enforced in the case of steam vessels calling at the port for such period of time only as is sufficient to land or embark passengers or to take in fresh water.

Boarding of Vessels and Information to be given.

41.—(1) The Master of every vessel boarded by a Port officer shall fill up correctly, and sign the form in the book handed to him, giving at the same time a correct list of the names and nationalities of all passengers, and a report of any casualties, accidents or deaths that may have occurred during the voyage. The passenger list shall be furnished in duplicate and alphabetically indexed.

(2) A list of all arms and explosives, which form part of the ordinary armament or cargo, of any vessel, or are required for the service of any vessel, for the personal use of the crew or the passengers thereof, shall be furnished on arrival to the Port officer.

(3) The nakhodas of all Asiatic craft shall report the arrival of their vessels to the Port officer and shall make declaration as to their cargo, passengers, arms and explosives, and whether any casualty, accident, or death, has occurred during the voyage.

(4) In the event of any casualty or accident or of the death of any member of the crew, passenger, or other person occurring on board any vessel before arrival, or whilst in the port, or in case of the desertion or removal of any of the crew, the Master shall forthwith report the same in writing to the Port officer.

Search Lights, Projectors, etc.

42.—No Captain or Master of any vessel, British or foreign, man-of-war, transport, or merchant ship shall, within port limits, permit any search light of any description to be used or exhibited on board such vessel without the permission of the Port officer, provided that this rule shall not apply to any vessel belonging to or in the service of His Majesty.

Police Signals.

43.—Police signals shall be as follows:—

By Day.—The flags "ST" displayed at the fore masthead.

By Night.—Two *red* lights hoisted vertically not less than 10 feet apart where they can best be seen.

Fire on board ship.

44.—(1) In case of fire breaking out on board any vessel within port limits—

By Day.—The Master shall display the flags "DQ" at the main and keep the ship's bell ringing until assistance arrives. A gun shall be fired if possible.

By Night.—The Master shall fire a gun if possible, burn a *blue* light, send up rockets and keep the ship's bell ringing until assistance arrives. The Master shall also hoist a *green* light over a *red* light at the peak or masthead, such lights to be at least 10 feet apart.

(2) The Master shall cause any powder, spirits or other explosive or inflammable substance, which may be on board, to be removed from the vessel as soon as possible after the fire is discovered.

(3) The Master of any vessel on fire shall obey or cause to be obeyed such orders as may be given him by the Port officer.

Soldiers, Sailors and Airmen of Foreign Powers.

45.—(1) No armed soldier, sailor, or airman, in the service of any foreign power shall land within the port without the permission of the Colonial Secretary, except as follows:—

(*a*) This order shall not apply to Officers landing armed for purposes of ceremony or funerals.

(*b*) Permission shall ordinarily be given for the landing of armed firing parties when required at funerals.

(2) Where one or more men-of-war or transports in the service of a foreign power are within the port, unarmed soldiers, sailors or airmen employed in such men-of-war or transports may land subject to the concurrence of the Colonial Secretary and in compliance with any conditions he may prescribe. Officers landing are permitted to wear their swords. If it is desired to land large numbers of men or a body of men in military formation adequate notice should always be given to the Colonial Secretary.

(3) For the purposes of this rule a steam vessel conveying upwards of one hundred soldiers, sailors, or airmen, in the service of a foreign power shall be deemed a "transport."

Singapore River.

General regulations for Singapore river, &c., will be found with the complete rules for the port, obtainable at the port.

APPENDIX II

Federated Malay States:—The Ports Enactment, 1923:

In exercise of the powers conferred upon them by section 10 of "the Ports Enactment, 1923," the Residents of Perak, Selangor, Negri Sembilan and Pahang, each in respect of the State whereof he is Resident, make the following Port rules to come into force upon the publication thereof in the *Gazette* and to have effect in all ports declared from time to time under section 3 of the said Enactment:

1.—For the purpose of these rules, "Steam vessel" includes any vessel propelled by machinery and every vessel which is under sail and not under steam shall be considered a sailing vessel, and every vessel under steam, whether under sail or not, shall be considered a steam vessel.

2.—Masters of all vessels in a port shall obey all directions which may be given by the Harbour Master of the port as to the berths and stations to be occupied by them respectively.

3.—The mooring of all vessels shall be carried out to the satisfaction of the Harbour Master.

4.—Vessels required by the Harbour Master to shift their berths shall do so at their own expense.

5.—Subject to the provisions of rule 2, and of any special rules having effect in particular ports, every vessel coming within the limits of a port shall anchor or secure to a wharf or a buoy whilst discharging passengers or cargo.

6.—Subject to the provisions of rule 2, no vessel shall anchor or lie in such a manner as to obstruct or render less convenient the use of any pier, jetty, landing place, wharf, dock, quay, or other similar work.

7.—No vessel shall anchor at a less distance from another than 1½ times the length of the longer vessel.

8.—All launches and small craft, should they have to anchor within port limits, shall do so well inshore, and clear of piers, wharves, and jetties.

9.—All vessels having European mails on board shall display the International code signal R.E.Y. on entering a port.

10.—Every steam vessel intending to leave a port shall fly the Blue Peter for at least six hours of daylight previous to moving from his moorings or weighing anchor, and every steam vessel preparing to leave her berth or anchorage shall blow a long blast on her whistle in sufficient time to give notice of her intention. Steam vessels intending to leave a port within six hours of their arrival at such port shall fly the Blue Peter on arrival.

11.—The signals to be made by Masters of vessels requiring the assistance of the Police while in port are as follows:—

By Day.—The International Code signal flags "ST" displayed at the fore masthead.

By Night.—Three lights, vertically disposed, not less than six feet apart, the highest and the lowest of which shall be *white* and the middle light *red*.

A continuous series of short blasts on either a hand fog horn or a whistle, and/or a continuous ringing of the ship's bell.

12.—In case of fire breaking out on any vessel within port limits and assistance being required:—

(i) *By Day.*—The Master shall display the International Code signal flags "NQ" and keep the ship's bell ringing until assistance arrives. A gun shall be fired if possible.

By Night.—The Master shall fire a gun, if possible, burn a *blue* light, send up rockets and keep the ship's bell ringing until assistance arrives. The Master shall also hoist a *green* light over a *red* light at the peak or masthead, such lights to be at least ten feet apart.

(ii) The Master shall cause any powder, spirits or other explosive or inflammable substance which may be on board to be removed from the vessel as soon as possible after the fire is discovered.

(iii) The Master of any vessel on fire shall obey or cause to be obeyed such orders as may be given him by the Harbour Master.

13.—Steam vessels approaching the limits of any port shall blow a blast on a steam whistle on passing any port signal station; steam vessels about to round any bend in a river within port limits shall blow a blast on the whistle; and steam vessels entering a port shall blow a long blast on the whistle on making out their signal flags on any wharf, passenger jetty or signal station.

14.—Every vessel arriving in any port shall be boarded as soon as possible by an officer of the Harbour Master's Department, who shall carry a register in which he shall cause to be entered the name of the vessel, date of arrival, name of owners, port and date of last departure, names of European passengers on board, numbers of other passengers according to nationalities, and a report of any death or casualty which may have occurred since leaving the last port. In the event of there being a dead animal onboard, the Master shall report the same.

No boat other than the boats of the Harbour Master or Health officer shall go alongside a vessel and no person not belonging to the Department of the Harbour Master or the Health officer shall board a vessel until the prescribed entries have been completed in the register.

15.—No firearms shall be discharged on board any vessel within the limits of a port except as provided for in rule 12.

16.—Nothing contained in rules 5, 10, or 14 shall be held to apply to vessels of war, vessels belonging to the Colony of the Straits Settlements, or vessels belonging to the Government of the Federated Malay States or of any of such States.

17.—No vessel or small craft shall, without the permission of the Harbour Master in that behalf, be made fast to any pier, jetty, landing place, wharf, quay, dock, or other similar work, or to any buoy or beacon belonging to the Government.

18.—A vessel shall, if the Harbour Master so directs, anchor, or secure to a buoy till ordered to go to a wharf.

19.—All steam vessels under way within the limits of any port shall proceed at the lowest possible speed of which the tide will permit having due regard to the safety of the vessel.

20.—Every vessel coming alongside a wharf shall be berthed and secured by the officers in charge of the vessel, or by the pilot if one is carried.

21.—Not more than two cargo lighters or tongkangs may lie alongside any vessel abreast of each other and not more than four lighters shall be secured astern, and such lighters be moored not more than two abreast.

22.—No vessel is to anchor within 200 yards ($182^{m}9$) of any submarine telegraph cable, the position of which is clearly defined by notices.

23.—The Master of any vessel taking in or discharging ballast or cargo while lying alongside a wharf shall rig between his vessel and the wharf a proper gangway, having double rails or stanchions with ropes rove taut through the same, the top rail or rope being not less than three feet and three inches high, and shall securely fix one end of such gangway to the deck of the vessel.

24.—Vessels of over 500 tons when at anchor or at a buoy shall provide an efficient gangway for the use of passengers which is to be kept clear of cargo lighters at all times.

25.—No pitch shall be boiled or heated on board any vessel alongside a wharf.

26.—No vessel having explosive or inflammable cargo on board shall take in or discharge any description of cargo between the hours of 6 p.m. and 6 a.m. without the written permission of the Harbour Master.

27.—Vessels with explosive or inflammable cargo on board shall display a red flag at the foremast by day, and a *red* light by night.

28.—No steam whistles or sirens shall be blown on board any vessel within the limits of any port except as provided for in these rules or in any special rules applicable to such port or as may be otherwise absolutely necessary as a warning to other craft.

APPENDIX III

LIST OF PORTS AVAILABLE FOR UNDER-WATER REPAIRS, with details of Largest Dry or Floating Dock or Patent Slip at each Port.

NAME OF PORT AND TYPE OF DOCK, ETC.	Length from Bilge of Caisson or Mitre Post of Gates at		Maximum Length of Keel Blocks	Breadth of Entrance at		‡ Distance {below(+) above(−)} Chart Datum level of			Springs	FLOATING DOCKS, PATENT SLIPS, &c.			REMARKS
	Coping Head	Floor Head		Coping	MHWS level	Sill	Blocks, at		rise	Maximum Depth over Blocks		Lifting Power	
							Entrance	Head		Forward	Aft		
	(1)*	(2)*	(3)	(4)†	(5)†	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
	feet	feet	feet	feet	feet	feet	feet	feet	feet	feet	feet	tons	
Belawan: Patent slip	119·3	—	—	—	—	—	—	—	—	—	—	280	
Penang-Bagar Dalau: Patent slip	450	120	—	22	—				8·6	7	14	400	§ Width of cradle. Available for vessels 150 feet long, 29 feet beam, and 400 tons.
Singapore: King George VI Dry dock .	1,006	995	—	130	130	+ 34·1	+ 34·1	+ 32·6	—	—	—	—	About 52 feet may be gained with caisson in outer stop.

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* In the case of Floating Docks, Patent Slips, &c., Column (1) = Extreme Length. Column (2) Length on Blocks or Cradle.

† In the case of Floating Docks, Column (4) = Breadth at Top. Column (5) = Breadth at botttom of Dock.

‡ In order to find the depths on Sill, &c, the quantities in columns (6), (7) and (8) should be applied according to sign to the predicted or calculated height of tide as obtained from the Admiralty Tide Tables.

APPENDIX IV

LIST OF PRINCIPAL PORTS, SHOWING PARTICULARS OF DEPTHS, &c.

PORT	Depth below Chart datum level		Rise of Tide		REMARKS
	In channel of approach	In anchorage	Spgs.	Nps.	
			Feet	Feet	
SABANG BAAI	Deep	15 to 20 fathoms	5	3¼	
BELAWAN	16 feet †	20 to 30 feet*	7	5	* Off entrance to channel.
PENANG :					
North channel......	26 feet ...	8 to 14 fathoms	7¾	5½	† In 1946.
South channel......	21 feet				
DINDINGS :					
North entrance	3¼ fathoms	9 fathoms*	9	6¼	* Off Pulau Pangkor.
South entrance	7 fathoms				
Lumut	23 feet* ..	—	9	6¼	* In River passage.
PORT SWETTENHAM :					
North Klang strait	26 feet ...	5 to 6 fathoms*	13¼	9½	* Off Port Swettenham.
South Klang strait	25 feet ...				
SINGAPORE :					
Road	7 fathoms	7 to 12 fathoms	9½	—	
Keppel harbour :					
West entrance ...	39 feet ...	—	9½	—	25 to 33 feet alongside wharves.
East entrance	18 to 28 feet	—		—	
Emma haven	Deep	—	3½	2¼	

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